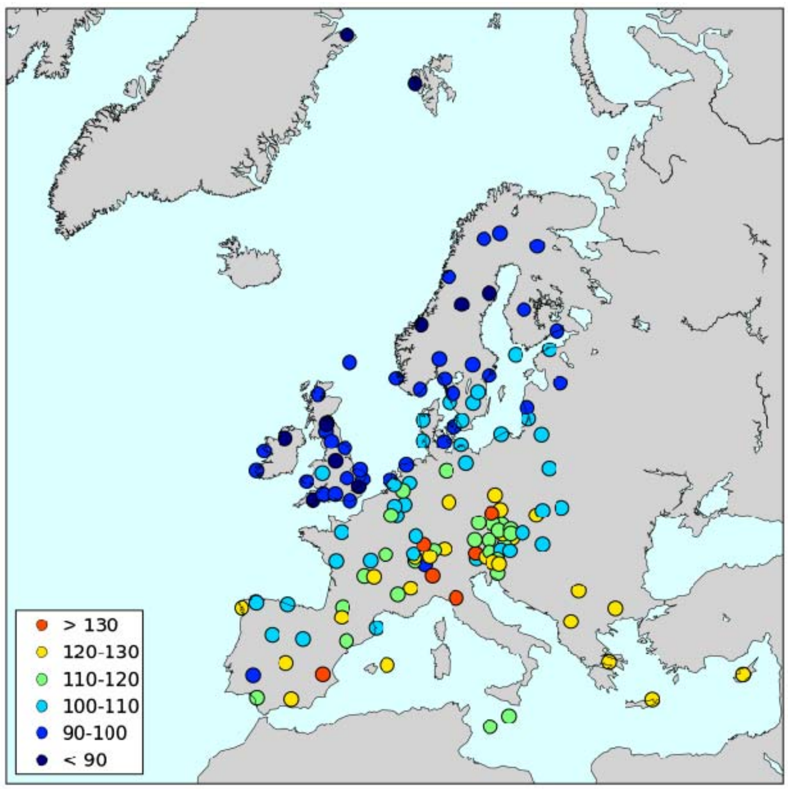
EMEP/CCC-Report 2/2018

EMEP Co-operative Programme for Monitoring and Evaluation of the Long-Range Transmission of Air Pollutants in Europe

Ozone measurements 2016

Anne-Gunn Hjellbrekke and Sverre Solberg



95-percentile
April-September, µg/m^3

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Ozone measurements 2016

1. Introduction

Ozone is a natural constituent of the atmosphere and plays a vital role in many atmospheric processes. However, man-made emissions of volatile organic compounds and nitrogen oxides have increased the photochemical formation of ozone in the troposphere. Until the end of the 1960s the problem was basically believed to be one of the big cities and their immediate surroundings. In the 1970s, however, it was found that the problem of photochemical oxidant formation is much more widespread. The ongoing monitoring of ozone at rural sites throughout Europe shows that episodes of high concentrations of ground-level ozone occur over most parts of the continent every summer. During such episodes, the ozone concentrations can reach values above ambient air quality standards over large regions and lead to adverse effects for human health and vegetation. Historical records of ozone measurements in Europe and North America indicate that in the last part of the nineteenth century the values were only about half of the average surface ozone concentrations measured in the same regions during the last 10-15 years (Bojkov, 1986; Volz and Kley, 1988).

The formation of ozone is due to a large number of photochemical reactions taking place in the atmosphere and depends on the temperature, humidity and solar radiation as well as the primary emissions of nitrogen oxides and volatile organic compounds. Together with the non-linear relationships between the primary emissions and the ozone formation, these effects complicates the abatement strategies for ground-level ozone and makes photochemical models crucial in addition to the monitoring data.

The EMEP ozone data from 2016 are presented in this report, which aims to give a short summary of the measurement data. A complete set of data, including raw data, annual statistics and monthly means, can be downloaded from the web at http://ebas.nilu.no and at http://www.nilu.no/projects/ccc.

2. Critical levels

Ozone concentrations vary widely from region to region, with the time of year, and with time of day. Typically, high concentrations of ozone are observed in periods with anticyclonic conditions. Such episodes may lead to adverse environmental effects such as impact on human health, agricultural crops, forests and materials. National authorities and international organisations have therefore defined certain threshold levels for ozone. Within WHO these are called “air quality guidelines”, within EU “target value”, “long-term objective” etc. and within UN-ECE “critical levels”. The values of the various threshold levels vary among these organisations and, additionally, the health based indicators are normally based on concentration (µg/m^3) whereas those related to vegetation are based on mixing ratio (ppb). An overview of various levels relevant for vegetation and human health is given in Table 1 and Table 2, respectively.

Table 1: Limit values for the protection of vegetation.

AOT40 (ppb hours)	Period	Reference	Comment
3000	3 months	CLRTAP (2011)	Critical level for crops and natural vegetation [1)]
5000	1 April - 1 Oct	CLRTAP (2011)	Critical level for forest [1)]
6000	3.5 months	CLRTAP (2011)	Critical level for horticultural crops
9000	1 May – 1 Aug	EU (2008)	EU's target value for vegetation [2,3)]
3000	1 May - 1 Aug	EU (2008)	EU's long-term objective for vegetation [2,3)]

1) ECE's AOT values should be based on the hours with global incoming radiation > 50 W/m^2
2) EU's AOT values should be based on the period 08-20 CET
3) The EU directive uses $\mu g/m^3$ and a factor 2 $\mu g/m^3$ = 1 ppb

Table 2: Limit values for the protection of human health.

Value ($\mu g/m^3$)	Averaging time (hours)	Ref	Description
180	1	EU (2008)	EU's information threshold
240	1	EU (2008)	EU's alert threshold
120	8[1)]	EU (2008)	EU's target value. 8-hour mean value not to be exceeded on more than 25 days per year averaged over 3 years. To be fulfilled by 1.1.2010
120	8[1)]	EU (2008)	EU's long-term objective.
100	8[1)]	WHO (2006)	WHO's air quality guideline (global update 2005)

[1)] The highest 8-hour running mean value for each day calculated such that the 8-hour periods are assigned to the day on which the period ends.

Within UN-ECE, scientific evidence has suggested that AOT40-based critical levels for vegetation (Gothenburg Protocol of 1999) should be replaced by stomatal flux-based critical levels. Flux based critical levels have been developed to reflect that the real impacts depend on the amount of the pollutant transported into the leaves, whereas AOT40 is only based on the concentration of ozone in the atmosphere at the top of the plant canopy (Mills et al., 2011). Concentration-based critical levels (AOT_x) for estimating the risk of damage to vegetation are, however, still included where climatic data or suitable flux models are not available.

The concentration-based critical level is 3000 ppbh (3-months period) for agricultural crops and (semi-)natural vegetation and 5000 ppbh (6-months period) for forest trees. The former critical level for forest was 10 000 ppbh, and the new, lower level is seen as a clear improvement compared to the former level (CLRTAP, 2011). The "Modelling and mapping manual" strongly recommends that the critical levels should be based on the concentrations at the canopy-height whereas the measurements normally are taken at 2 m height above ground. When meteorological measurements are not available, it is recommended to adjust the measured data to values relevant for the canopy-height by applying a given vertical profile depending on the type of vegetation.

Furthermore, the period for calculation of AOT40 should reflect the true growing season and should thus be adapted to the climate of the various regions in Europe, as specified in the Mapping Manual (CLRTAP, 2011). This leads to large differences in the applied period, from March-May in East Mediterranean to June-

August in North Europe, which in turn has major consequences for the calculated AOT values. Since the aim of the present report is to document the general status of the ozone levels and not to provide any effect based calculations, the same 3-months period (May-July) is used for all stations. This also corresponds to the period stated in the EU directive. Moreover, no adjustment of the measured values to take the canopy-height into account is done in this report. The measurement data are used directly.

EU has in the ozone directive (2002/3/EC) and the ambient air quality directive (2008/50/EC) defined a number of target values and long-term objectives for the protection of vegetation and human health. The target value, to be met by 1.1.2010, for human health is 120 $\mu g/m^3$ (8h mean) which is not to be exceeded on more than 25 days per year averaged over 3 years. For protection of vegetation, AOT40 (May-July) should not exceed 18 000 $\mu g/m^3h$ averaged over five years. In addition information should be given to the population when hourly means exceed 180 $\mu g/m^3$ and an alert warning should be issued if hourly means exceed 240 $\mu g/m^3$.

EU's long-term objective for the protection of human health defines 120 $\mu g/m^3$ as the maximum daily 8-hour mean value to occur within a calendar year. The long-term objective for the protection of vegetation is defined as an AOT40 value of 6000 $\mu g/m^3h$ for the period May-July. Community progress towards attaining the long-term objective using the year 2020 as a benchmark shall be reviewed.

WHO has also defined air quality guidelines for the protection of human health and provided a global update of these levels, including a new guideline for ground-level ozone, in 2005 (WHO, 2006). Additionally, within both WHO, EU and UN-ECE the parameter SOMO35, defined as the sum of maximum 8-hour ozone levels over 35 ppb, is used as an indicator for health effects without any specified threshold level.

Flux-based critical levels for various types of vegetation have been approved for inclusion in LRTAP Convention's modelling and mapping manual (CLRTAP, 2011). The DO^3SE model is used to estimate the stomatal ozone flux as a function of the ozone concentration at the leaf boundary layer, the transfer of ozone across this boundary layer, the stomatal conductance to ozone and the ozone deposition to the leaf cuticle. The accumulated stomatal flux over a specified time interval is estimated by the parameter POD_Y (the Phytotoxic Ozone Dose over a threshold flux of Y nmol m^{-2} PLA s^{-1}|). In this context, Y represents a detoxification threshold, below which it is assumed that any ozone absorbed by the plant will be detoxified. Thus, POD_Y can be described as the "effective dose" or "effective flux". POD_Y is the flux-based analogy to the concentration-based AOT_X.

3. Measurement network

Surface ozone measurements have been a part of the EMEP extended (voluntary) measurement activities since the third phase (1 January 1984–31 December 1986). Due to the lack of funds, the systematic collection and checking of data within EMEP, did not start until 1 January 1987. The measurement of ozone data within the EMEP region was a continuation of the OECD's oxidant data collection programme OXIDATE. Ozone data from the OXIDATE project have been reported in three reports (Grennfelt and Schjoldager, 1984; Grennfelt et al., 1988 and 1989).

This report presents surface ozone data measured at rural background EMEP sites during 2016 with emphasis on statistical summaries and geographical distributions. Earlier reports are listed in Annex 5.

Table 3 and Figure 1 show the location of the monitoring stations reporting data from whole or part of 2016. In total 139 stations from 27 different countries reported data. One of these sites (Ispra), is operated by the Commission of the European communities in Italy.

Table 3: List of EMEP ozone monitoring stations in operation 2016.

Code	Station name	Latitude	Longitude	Altitude
AT0002R	Illmitz	47°46'00"N	16°46'00"E	117
AT0005R	Vorhegg	46°40'40"N	12°58'20"E	1020
AT0030R	Pillersdorf bei Retz	48°43'16"N	15°56'32"E	315
AT0032R	Sulzberg	47°31'45"N	09°55'36"E	1020
AT0034G	Sonnblick	47°03'16"N	12°57'30"E	3106
AT0038R	Gerlitzen	46°41'37"N	13°54'54"E	1895
AT0040R	Masenberg	47°20'53"N	15°52'56"E	1170
AT0041R	Haunsberg	47°58'23"N	13°00'58"E	730
AT0042R	Heidenreichstein	48°52'43"N	15°02'48"E	570
AT0043R	Forsthof	48°06'22"N	15°55'10"E	581
AT0045R	Dunkelsteinerwald	48°22'16"N	15°32'48"E	320
AT0046R	Gänserndorf	48°20'05"N	16°43'50"E	161
AT0047R	Stixneusiedl	48°03'03"N	16°40'36"E	240
AT0048R	Zoebelboden	47°50'19"N	14°26'29"E	899
AT0049R	Grebenzen bei St. Lamprecht	47°02'25"N	14°19'48"E	1648
AT0050R	Graz Lustbuehel	47°04'01"N	15°29'37"E	481
BE0001R	Offagne	49°52'40"N	05°12'13"E	430
BE0032R	Eupen	50°37'46"N	06°00'04"E	295
BE0035R	Vezin	50°30'12"N	04°59'22"E	160
BG0053R	Rojen peak	41°41'45"N	24°44'19"E	1750
CH0001G	Jungfraujoch	46°32'51"N	07°59'06"E	3578
CH0002R	Payerne	46°48'47"N	06°56'41"E	489
CH0003R	Tänikon	47°28'47"N	08°54'17"E	539
CH0004R	Chaumont	47°02'59"N	06°58'46"E	1137
CH0005R	Rigi	47°04'03"N	08°27'50"E	1031
CY0002R	Agia Marina	35°02'21"N	33°03'29"E	532
CZ0001R	Svratouch	49°44'00"N	16°03'00"E	737
CZ0003R	Košetice (NOAK)	49°35'00"N	15°05'00"E	534
CZ0005R	Churanov	49°04'00"N	13°36'00"E	1118
DE0001R	Westerland	54°55'32"N	08°18'35"E	12
DE0002R	Waldhof	52°48'08"N	10°45'34"E	74
DE0003R	Schauinsland	47°54'53"N	07°54'31"E	1205
DE0007R	Neuglobsow	53°10'00"N	13°02'00"E	62
DE0008R	Schmücke	50°39'00"N	10°46'00"E	937
DE0009R	Zingst	54°26'00"N	12°44'00"E	1
DK0005R	Keldsnor	54°44'47"N	10°44'10"E	10
DK0010G	Villum Research Station, Station Nord	81°36'00"N	16°40'12"W	20
DK0012R	Risoe	55°41'37"N	12°05'09"E	3
DK0031R	Ulborg	56°17'26"N	08°25'39"E	10
EE0009R	Lahemaa	59°30'00"N	25°54'00"E	32
ES0001R	San Pablo de los Montes	39°32'52"N	04°20'55"W	917
ES0005R	Noya	42°43'41"N	05°55'25"W	683
ES0006R	Mahón	39°52'00"N	04°19'00"E	78
ES0007R	Víznar	37°14'00"N	03°32'00"W	1265
ES0008R	Niembro	43°26'32"N	04°51'01"W	134
ES0009R	Campisábalos	41°16'52"N	03°08'34"W	1360

Table 3, cont.

Code	Station name	Latitude	Longitude	Altitude
ES0010R	Cabo de Creus	42°19'10"N	03°19'01"E	23
ES0011R	Barcarrota	38°28'33"N	06°55'22"W	393
ES0012R	Zarra	39°05'10"N	01°06'07"W	885
ES0013R	Penausende	41°17'00"N	05°52'00"W	985
ES0014R	Els Torms	41°24'00"N	00°43'00"E	470
ES0016R	O Saviñao	43°13'52"N	07°41'59"W	506
ES0017R	Doñana	37°01'50"N	06°19'55"W	5
FI0009R	Utö	59°46'45"N	21°22'38"E	7
FI0018R	Virolahti III	60°31'48"N	27°40'03"E	4
FI0022R	Oulanka	66°19'13"N	29°24'06"E	310
FI0037R	Ähtäri II	62°35'00"N	24°11'00"E	180
FI0096G	Pallas (Sammaltunturi)	68°00'00"N	24°09'00"E	340
FR0008R	Donon	48°30'00"N	07°08'00"E	775
FR0009R	Revin	49°54'00"N	04°38'00"E	390
FR0010R	Morvan	47°16'00"N	04°05'00"E	620
FR0013R	Peyrusse Vieille	43°37'00"N	00°11'00"E	200
FR0014R	Montandon	47°18'00"N	06°50'00"E	836
FR0015R	La Tardière	46°39'00"N	00°45'00"W	133
FR0016R	Le Casset	45°00'00"N	06°28'00"E	1750
FR0017R	Montfranc	45°48'00"N	02°04'00"E	810
FR0018R	La Coulonche	48°38'00"N	00°27'00"W	309
FR0019R	Pic du Midi	42°56'12"N	00°08'31"E	2877
FR0023R	Saint-Nazaire-le-Désert	44°34'10"N	05°16'44"E	605
FR0025R	Verneuil	46°48'53"N	02°36'36"E	182
FR0030R	Puy de Dôme	45°46'00"N	02°57'00"E	1465
GB0002R	Eskdalemuir	55°18'47"N	03°12'15"W	243
GB0006R	Lough Navar	54°26'35"N	07°52'12"W	126
GB0013R	Yarner Wood	50°35'47"N	03°42'47"W	119
GB0014R	High Muffles	54°20'04"N	00°48'27"W	267
GB0015R	Strath Vaich Dam	57°44'04"N	04°46'28"W	270
GB0031R	Aston Hill	52°30'14"N	03°01'59"W	370
GB0033R	Bush	55°51'31"N	03°12'18"W	180
GB0035R	Great Dun Fell	54°41'00"N	02°27'00"W	847
GB0037R	Ladybower Res.	53°23'56"N	01°45'12"W	420
GB0038R	Lullington Heath	50°47'34"N	00°10'46"E	120
GB0039R	Sibton	52°17'38"N	01°27'47"E	46
GB0043R	Narberth	51°14'00"N	04°42'00"W	160
GB0045R	Wicken Fen	52°17'54"N	00°17'34"W	5
GB0048R	Auchencorth Moss	55°47'32"N	03°14'34"W	260
GB0049R	Weybourne	52°57'02"N	01°07'19"E	16
GB0050R	St. Osyth	51°46'41"N	01°04'56"E	8
GB0052R	Lerwick	60°08'21"N	01°11'07"W	85
GB0053R	Charlton Mackrell	51°03'23"N	02°41'00"W	54
GB1055R	Chilbolton Observatory	51°08'59"N	01°26'18"W	78
GR0001R	Aliartos	38°22'00"N	23°05'00"E	110
GR0002R	Finokalia	35°19'00"N	25°40'00"E	250
HU0002R	K-puszta	46°58'00"N	19°35'00"E	125
HU0003R	Farkasfa	46°54'36"N	16°19'12"E	312
IE0001R	Valentia Observatory	51°56'23"N	10°14'40"W	11
IE0031R	Mace Head	53°10'00"N	09°30'00"W	15
IT0004R	Ispra	45°48'00"N	08°38'00"E	209
IT0009R	Mt Cimone	44°11'00"N	10°42'00"E	2165
IT0018R	Lampedusa	35°31'06"N	12°37'50"E	45
LT0015R	Preila	55°21'00"N	21°04'00"E	5
LV0010R	Rucava	56°09'43"N	21°10'23"E	18
LV0016R	Zoseni	57°08'07"N	25°54'20"E	188
MK0007R	Lazaropole	41°32'10"N	20°41'38"E	1332
MT0001R	Giordan lighthouse	36°04'24"N	14°13'09"E	167
NL0007R	Eibergen	52°05'00"N	06°34'00"E	20
NL0009R	Kollumerwaard	53°20'02"N	06°16'38"E	1
NL0010R	Vredepeel	51°32'28"N	05°51'13"E	28
NL0091R	De Zilk	52°18'00"N	04°30'00"E	4
NL0644R	Cabauw Wielsekade	51°58'28"N	04°55'25"E	1

Table 3, cont.

Code	Station name	Latitude	Longitude	Altitude
NO0002R	Birkenes II	58°23'19"N	08°15'07"E	219
NO0015R	Tustervatn	65°50'00"N	13°55'00"E	439
NO0039R	Kårvatn	62°47'00"N	08°53'00"E	210
NO0042G	Zeppelin mountain (Ny-Ålesund)	78°54'24"N	11°53'18"E	474
NO0043R	Prestebakke	59°00'00"N	11°32'00"E	160
NO0052R	Sandve	59°12'00"N	05°12'00"E	15
NO0056R	Hurdal	60°22'21"N	11°04'41"E	300
PL0002R	Jarczew	51°49'00"N	21°59'00"E	180
PL0003R	Sniezka	50°44'00"N	15°44'00"E	1603
PL0004R	Leba	54°45'00"N	17°32'00"E	2
PL0005R	Diabla Gora	54°09'00"N	22°04'00"E	157
RS0005R	Kamenici Vis	43°24'00"N	21°57'00"E	813
SE0005R	Bredkälen	63°51'00"N	15°20'00"E	404
SE0012R	Aspvreten	58°48'00"N	17°23'00"E	20
SE0013R	Esrange	67°53'00"N	21°04'00"E	475
SE0014R	Råö	57°23'38"N	11°54'50"E	5
SE0018R	Asa	57°09'52"N	14°46'57"E	180
SE0019R	Östad	57°57'09"N	12°24'11"E	65
SE0020R	Hallahus	56°02'34"N	13°08'53"N	190
SE0032R	Norra-Kvill	57°49'00"N	15°34'00"E	261
SE0035R	Vindeln	64°15'00"N	19°46'00"E	225
SE0039R	Grimsö	59°43'41"N	15°28'19"E	132
SI0008R	Iskrba	45°34'00"N	14°52'00"E	520
SI0031R	Zarodnje	46°25'43"N	15°00'12"E	770
SI0032R	Krvavec	46°17'58"N	14°32'19"E	1740
SI0033R	Kovk	46°07'43"N	15°06'50"E	600
SK0002R	Chopok	48°56'00"N	19°35'00"E	2008
SK0004R	Stará Lesná	49°09'00"N	20°17'00"E	808
SK0006R	Starina	49°03'00"N	22°16'00"E	345
SK0007R	Topolniky	47°57'36"N	17°51'38"E	113

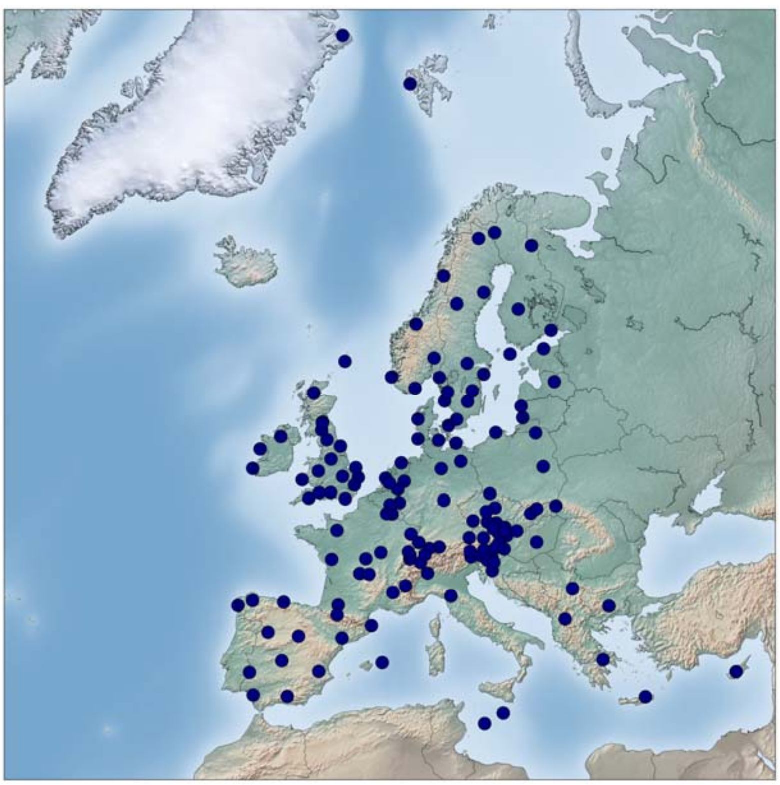

Figure 1: Location of the monitoring stations.

Until 10/09/2008, ozone has been measured at four different heights at Donon. Since 11/09/2008 ozone is measured at one sampling height, 3.5 m, at a new site next to the old deleted tower.

The monitoring stations are selected by the countries. Information about the ozone data quality, calibration and maintenance procedures was in 2000 collected from the participants (Aas et al., 2000). A document, "Overview of the routines for calibration and maintenance", is also available under ozone section at http://www.nilu.no/projects/ccc/emepdata.html.

The UV absorption method is the only measurement method in use in 2016.

All data presented in this report are given in µg/m^3. The conversion factor used to calculate from nmol/mol to µg/m3 is given in Table 4. Most countries use a conversion factor of 2.0, which corresponds to 20°C and 1013 hPa. For the high altitude site Jungfraujoch in Switzerland, the mean annual conditions (-8°C, 653 mbar) are used, giving a conversion factor of 1.42. A number of countries report ozone data in mixing ratio, and in this case the data are converted to µg/m^3 by multiplying by 2.0 at the CCC, corresponding to standard conditions of 20°C and 1 atm.

Table 4: Conversion factor ppb – µg/m^3.

Country	Conversion factor
Austria	2.0
Belgium	2.0
Bulgaria	
Cyprus	2.0
Czech Republic	Reported in mixing ratio
Denmark	2.0
Estonia	2.0
Finland	2.0
France	2.0
Germany	Reported in mixing ratio
Greece (Aliartos)	1.96
Greece (Finokalia)	Reported in mixing ratio
Hungary	Reported in mixing ratio
Ireland (Mace Head)	Reported in mixing ratio
Italy	Reported in mixing ratio
Latvia	2.0
Lithuania	2.0
Malta	Reported in mixing ratio
Netherlands	2.0
Norway	2.0
Poland (IMWM)	Reported in mixing ratio
Poland (Diabla Gora)	2.0
Slovakia	2.0
Slovenia	Reported in mixing ratio
Spain	2.0
Sweden	2.0
Switzerland	2.0 (1.42 at CH0001R)
United Kingdom	Reported in mixing ratio

4. Data completeness

The annual means and data capture (number of valid measurements in percent of the total number of measurements) for each station is given in Table 5. The data capture is in general good, 121 stations have a data capture above 90%.

Table 5: Annual average and data capture in per cent, 2016.

Code	Station	Annual average	Data capture 2016
AT0002R	Illmitz	57.4	93.8
AT0005R	Vorhegg	61.8	94.0
AT0030R	Pillersdorf bei Retz	56.8	94.3
AT0032R	Sulzberg	78.1	95.5
AT0034G	Sonnblick	93.4	50.6
AT0034G	Sonnblick	100.5	41.0
AT0038R	Gerlitzen	90.5	95.7
AT0040R	Masenberg	76.3	95.5
AT0041R	Haunsberg	65.0	94.7
AT0042R	Heidenreichstein	55.5	95.5
AT0043R	Forsthof	64.5	94.3
AT0045R	Dunkelsteinerwald	51.7	95.2
AT0046R	Gänserndorf	52.3	95.2
AT0047R	Stixneusiedl	54.9	95.6
AT0048R	Zoebelboden	71.1	95.2
AT0049R	Grebenzen bei St. Lamprecht	85.4	95.2
AT0050R	Graz Lustbuehel	52.5	95.2
BE0001R	Offagne	51.7	95.5
BE0032R	Eupen	47.9	95.9
BE0035R	Vezin	42.5	96.1
BG0053R	Rojen peak	86.6	84.7
CH0001G	Jungfraujoch	74.0	96.7
CH0002R	Payerne	49.8	99.3
CH0003R	Tänikon	50.0	99.3
CH0004R	Chaumont	80.4	97.5
CH0005R	Rigi	77.5	99.3
CY0002R	Ayia Marina	97.5	93.4
CZ0001R	Svratouch	68.5	92.7
CZ0003R	Kosetice	63.9	95.1
CZ0003R	Kosetice	69.2	91.9
CZ0005R	Churanov	71.2	97.4
DE0001R	Westerland	67.4	86.5
DE0002R	Waldhof	50.7	93.8
DE0003R	Schauinsland	83.6	91.7
DE0007R	Neuglobsow	49.0	94.0
DE0008R	Schmücke	67.4	95.0
DE0009R	Zingst	59.5	94.9
DK0005R	Keldsnor	57.3	90.3
DK0010G	Villum Research Station, Station Nord	63.4	88.2
DK0012R	Risoe	57.3	90.3
DK0031R	Ulborg	60.8	87.3
EE0009R	Lahemaa	54.7	99.7
ES0001R	San Pablo de los Montes	84.5	98.2
ES0005R	Noya	71.6	97.5

Table 5, cont.

Code	Station	Annual average	Data capture 2016
ES0006R	Mahón	87.3	96.6
ES0007R	Víznar	85.3	97.5
ES0008R	Niembro	71.5	97.1
ES0009R	Campisabalos	67.1	98.1
ES0010R	Cabo de Creus	69.1	98.6
ES0011R	Barcarrota	47.2	98.6
ES0012R	Zarra	90.8	98.8
ES0013R	Penausende	68.0	98.8
ES0014R	Els Torms	74.2	98.6
ES0016R	O Saviñao	56.5	98.8
ES0017R	Doñana	63.1	97.0
FI0009R	Utö	66.7	99.5
FI0018R	Virolahti III	52.5	99.6
FI0022R	Oulanka	59.2	99.3
FI0037R	Ähtäri II	53.1	99.7
FI0096G	Pallas (Sammaltunturi)	67.2	98.0
FR0008R	Donon	53.1	99.2
FR0009R	Revin	56.3	99.5
FR0010R	Morvan	63.3	93.4
FR0013R	Peyrusse Vieille	66.9	92.8
FR0014R	Montandon	55.2	98.3
FR0015R	La Tardière	56.3	97.8
FR0016R	Le Casset	91.1	97.8
FR0017R	Montfranc	75.5	98.0
FR0018R	La Coulonche	64.0	99.1
FR0019R	Pic du Midi	93.7	97.6
FR0023R	Saint-Nazaire-le-Désert	59.8	96.6
FR0025R	Verneuil	52.7	98.8
FR0030R	Puy de Dôme	85.3	94.6
GB0002R	Eskdalemuir	54.2	98.0
GB0006R	Lough Navar	46.9	96.0
GB0013R	Yarner Wood	54.8	93.8
GB0014R	High Muffles	58.6	91.2
GB0015R	Strath Vaich Dam	67.9	86.2
GB0031R	Aston Hill	63.1	93.4
GB0033R	Bush	56.8	89.0
GB0035R	Great Dun Fell	54.0	79.0
GB0037R	Ladybower Res.	54.1	94.8
GB0038R	Lullington Heath	55.0	96.8
GB0039R	Sibton	51.6	98.7
GB0043R	Narberth	59.7	99.1
GB0045R	Wicken Fen	46.9	97.9
GB0048R	Auchencorth Moss	55.9	95.7
GB0049R	Weybourne	60.5	98.6
GB0050R	St. Osyth	49.0	94.8
GB0052R	Lerwick	68.9	97.9
GB0053R	Charlton Mackrell	58.2	98.8
GB1055R	Chilbolton Observatory	48.9	94.1
GR0001R	Aliartos	67.5	89.7
GR0002R	Finokalia	93.7	54.8
HU0002R	K-puszta	45.9	88.9
HU0003R	Farkasfa	51.8	74.8

Table 5, cont.

Code	Station	Annual average	Data capture 2016
IE0001R	Valentia Observatory	69.1	96.9
IE0031R	Mace Head	71.3	100.0
IT0004R	Ispra	47.8	90.6
IT0009R	Mt Cimone	98.9	86.0
IT0018R	Lampedusa	90.4	86.0
LT0015R	Preila	57.3	98.1
LV0010R	Rucava	52.7	59.0
LV0016R	Zoseni	52.4	64.5
MK0007R	Lazaropole	86.2	95.3
MT0001R	Giordan lighthouse	91.4	90.8
NL0007R	Eibergen	40.5	98.1
NL0009R	Kollumerwaard	47.7	98.0
NL0010R	Vredepeel	43.7	95.7
NL0091R	De Zilk	49.4	96.8
NL0644R	Cabauw Wielsekade	41.6	97.6
NO0002R	Birkenes II	60.5	99.2
NO0015R	Tustervatn	66.8	93.8
NO0039R	Kårvatn	52.4	99.2
NO0042G	Zeppelin mountain (Ny-Ålesund)	70.3	93.6
NO0043R	Prestebakke	57.6	99.6
NO0052R	Sandve	60.8	97.2
NO0056R	Hurdal	55.1	96.2
PL0002R	Jarczew	44.9	99.6
PL0003R	Sniezka	77.3	99.9
PL0004R	Leba	58.8	99.9
PL0005R	Diabla Gora	50.4	98.5
RS0005R	Kamenicki vis	81.5	80.6
SE0005R	Bredkälen	58.5	99.6
SE0012R	Aspvreten	51.1	90.4
SE0013R	Esrange	66.5	99.9
SE0014R	Råö	61.7	99.4
SE0018R	Asa	54.7	98.2
SE0019R	Östad	52.0	99.7
SE0020R	Hallahus	59.5	98.7
SE0032R	Norra-Kvill	64.7	99.4
SE0035R	Vindeln	52.8	99.7
SE0039R	Grimsö	56.6	97.4
SI0008R	Iskrba	49.5	95.2
SI0031R	Zarodnje	72.4	94.0
SI0032R	Krvavec	90.8	93.7
SI0033R	Kovk	75.4	94.1
SK0002R	Chopok	91.2	82.0
SK0004R	Stará Lesná	58.1	97.4
SK0006R	Starina	58.1	72.5
SK0007R	Topolniky	48.6	93.3

Missing data in the measurement series may be critical, especially in summer when the highest ozone concentrations occur. In particular, calculations of

AOT40-values may be strongly affected by missing data, and a correction is necessary in order to obtain comparable calculations. In the mapping of AOT40, a data capture of 85% is required and an adjustment proportional to the number of missing data is applied, i.e. exposure index divided by the fraction of data available. This correction gives a good approximation when the missing data are randomly scattered throughout the dataset, but a better correction is needed for larger gaps in the dataset. Calculations of percentiles are less sensitive to missing data, and a data capture of 75% is regarded as sufficient for the mapping.

5. Concentration summaries and episodes

The number of ozone exceedances was low in 2016 compared to previous years (Figure 2). During the past decades, the summers of 2003 and 2006 had very large number of exceedances, principally due to very warm weather (EEA, 2011).

The highest one-hour ozone concentrations in 2016 were measured at Noia in Spain (228 $\mu g/m^3$, August 12) and at Ispra in Italy (213 $\mu g/m^3$, July 19) (Table 1.1, Annex 1). In total concentrations above 200 $\mu g/m^3$ were only measured at three sites in Central Europe, which is considerably lower than in 2015. The lowest maximum concentrations were measured at the remote sites Villum research station, Station Nord in Greenland (91 $\mu g/m^3$) and Zeppelin mountain in Svalbard (106 $\mu g/m^3$).

Exceedances of the information threshold of 180 $\mu g/m^3$ were observed at 14 sites, mostly in Belgium, the Netherlands, Germany and Italy, compared to 33 sites in 2015 and seven sites in 2014. The unusual warm summers of 2003 and 2006 had 81 and 69 exceedances respectively.

Table 1.2 in Annex 1 shows the 25-, 50-, 75-, 90-, 95-, 98- and 99-percentiles for the period April-September. Graphical distributions of the 99-percentiles and 95-percentiles for stations with data capture higher than 75% are shown in Figure 1.1 and 1.2 in Annex 1. The lowest values are found in Northern Scandinavia. Ireland and the United Kingdom, where the 99-percentiles are below 110 $\mu g/m^3$. The concentrations are higher in Denmark, Sweden and the Baltics, where the 99-percentiles generally ranges from 110-130 $\mu g/m^3$, and at its highest in Italy. Germany and the Netherlands, where the 99-percentile values are above 140 $\mu g/m^3$.

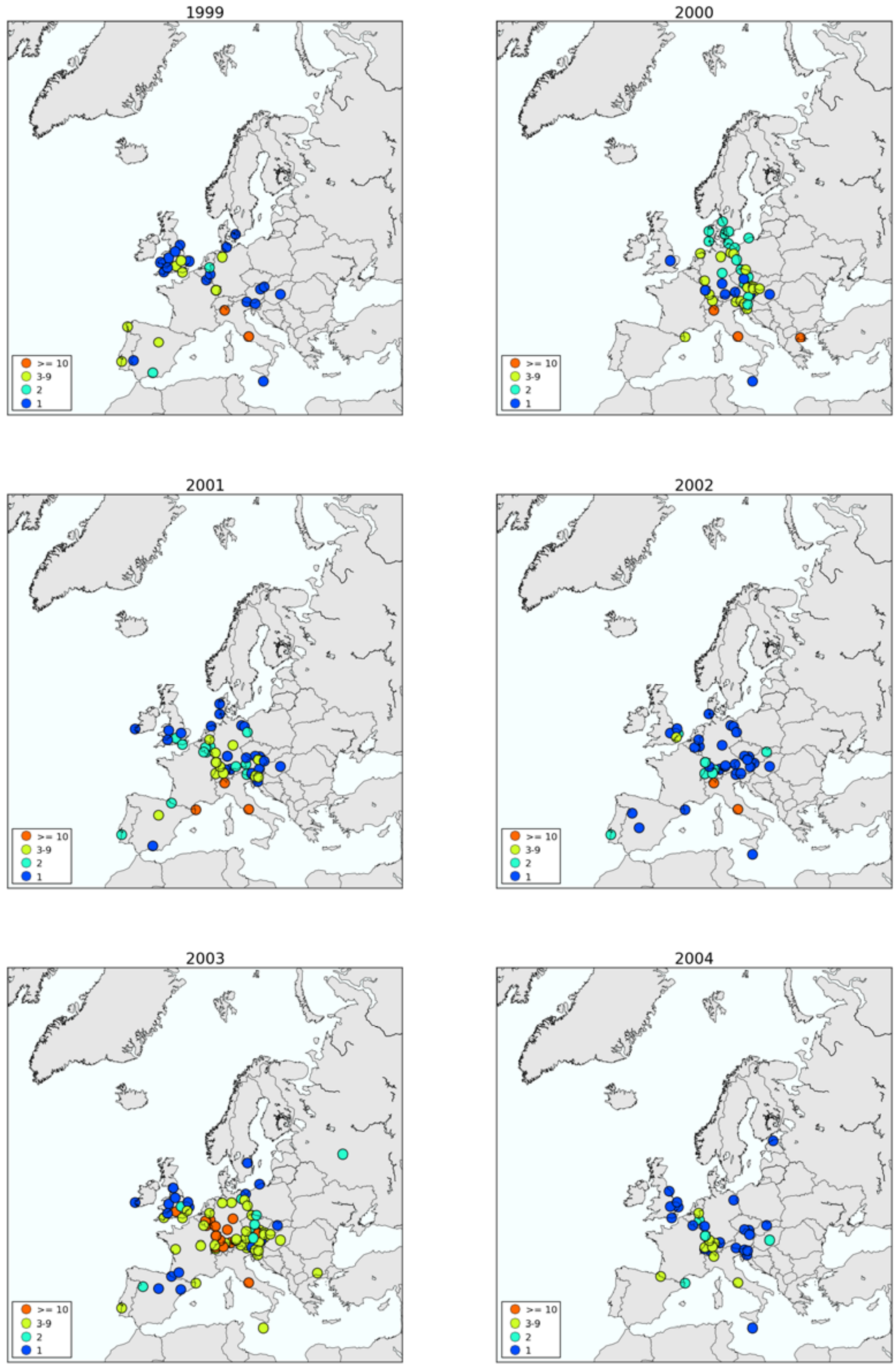

Figure 2: Number of exceedances of the threshold value of 180 $\mu g/m^3$ 1999-2016. (Unit: number of days.) Stations with zero exceedances are not shown.

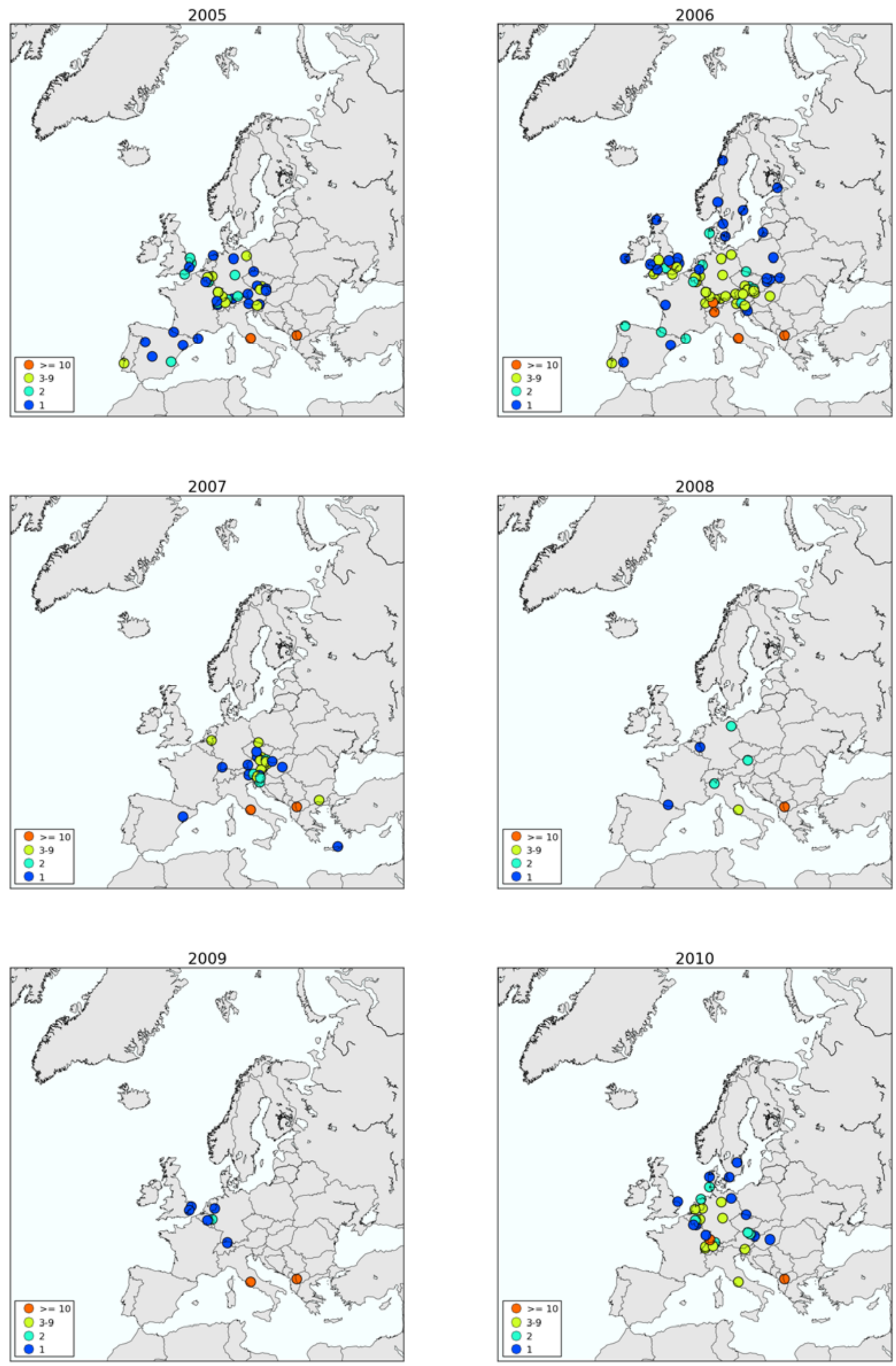

Figure 2, cont.

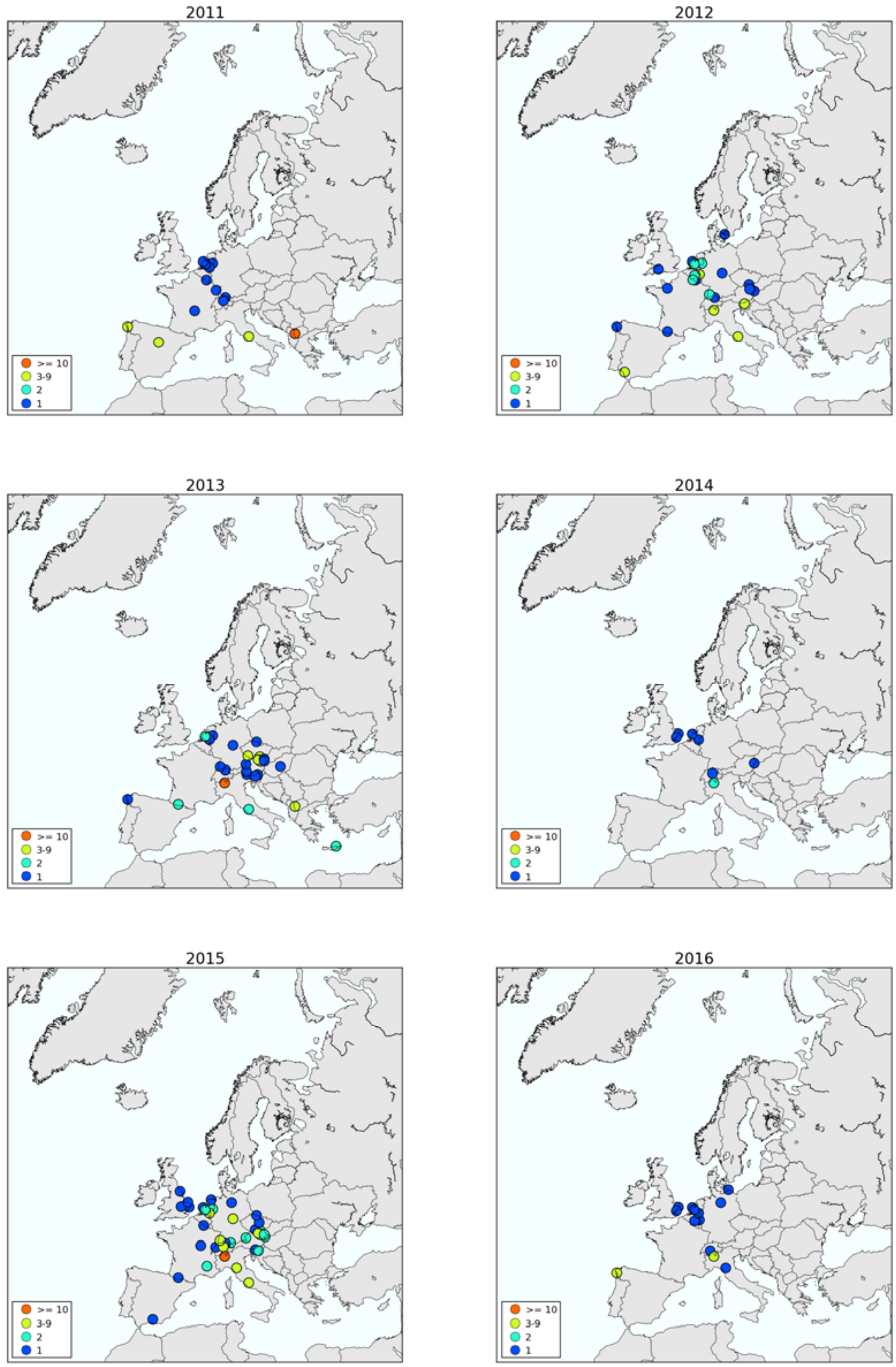

Figure 2, cont.

6. Calculation of AOT40

AOT40 for forest and agricultural crops for 2016 are shown in Table 2.1 in Annex 2, and the corresponding geographical distributions of AOT40 are shown in Figure 2.1–2.2. AOT values are calculated using daylight hours only, based on an estimated global radiation above 50 W/m^2 assuming clear skies. The maps of AOT40 show a general increasing gradient from west to east and from north to south. Low values are found in most parts of Northern Europe, while the highest values are found in Central Europe. Two sites in Europe (Spain and Cyprus) had AOT40 (May-July) values above 15 000 ppbh. The critical level for forest (5 000 ppbh) was exceeded at most sites in Central, Eastern and Southern Europe.

7. Seasonal variation

Monthly mean concentrations and data capture for 2016 are given in Table 3.1 (Annex 3). The concentrations show a clear pattern with maximum values during spring or early summer and minimum in autumn or winter. The seasonal variation is the net result of a number of processes such as dry deposition, photochemical loss (titration with NO_x) and formation, and varying influx from the stratosphere as well as varying background ozone concentrations. Plots of the seasonal variations 1990-2015 are given in Figure 3.1 in Annex 3. The seasonal variation of ozone shows characteristics, which seem to be bound by the geographical location of the station (Roemer et al., 1996). In Central and Alpine Europe the variation is characterised by a broad summer maximum with high monthly means from May to August. A springtime maximum in April and May followed by a gradual decline to a minimum in November-December is found for sites in England, the Netherlands and the southern parts of Scandinavia and Finland. A spring maximum followed by a minimum in the summer is generally found in Ireland, Scotland and the northern parts of Scandinavia and Finland.

Figure 3 shows geographical distribution of monthly mean concentration for each month in 2016.

These monthly maps reflect the differences in seasonal cycle in different areas of Europe with a May maximum in northern parts and a prolonged summer maximum in the south. In winter all of central Europe acts as an ozone sink through the titration with NO whereas the outskirts (the Arctic and the Mediterranean Ocean) is less affected by the titration and thus show higher mean levels of ozone. In spring, i.e. April-May, higher levels are seen in most of the Europe reflecting the combined effect of higher temperatures, stronger radiation and biogenic and anthropogenic emissions when going from winter to spring. From June, the mean levels are again reduced in northern parts whereas it stays high until September in the south reflecting the longer period of photochemical formation in that area combined with the shorter lifetime (and thus shorter transport distance) due to more efficient dry deposition and uptake in vegetation.

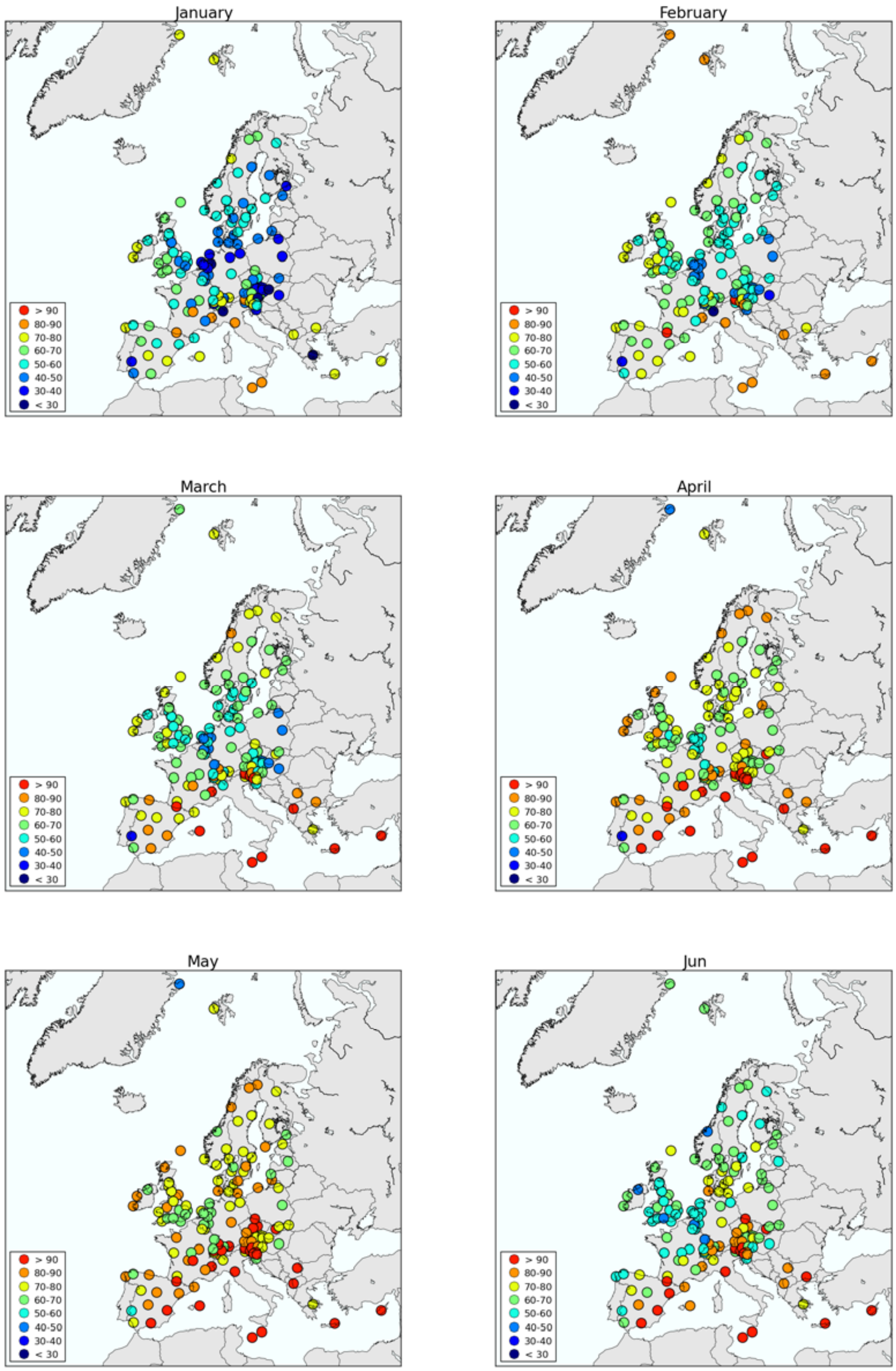

Figure 3:   Geographical distribution of monthly mean values 2016.

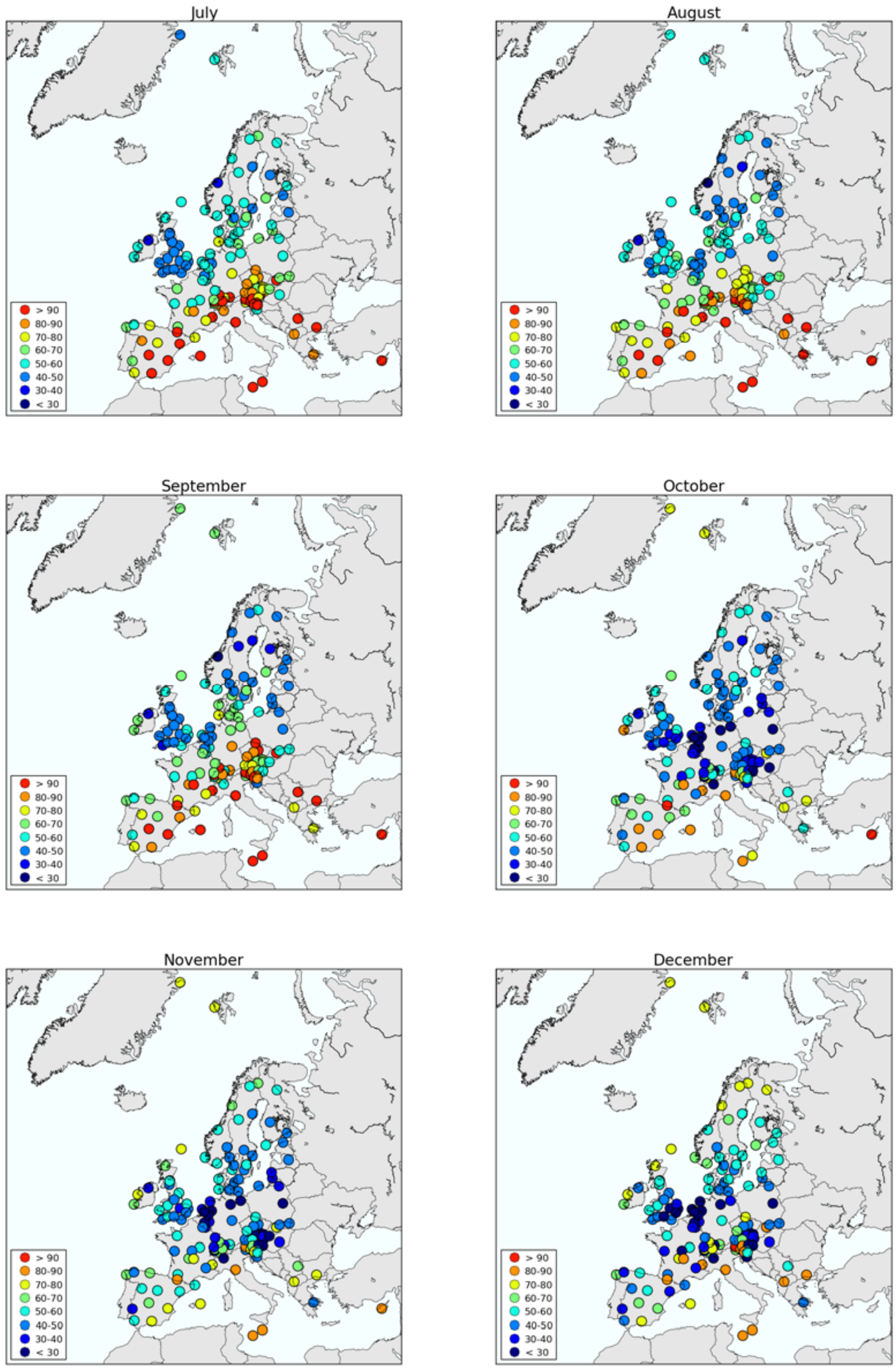

Figure 3, cont.

8. Diurnal variation

In addition to the seasonal variation, ozone concentrations show a variation on a shorter time scale. The average diurnal variation of surface ozone for summer (April-September) 2016 is shown in Annex 4. In general the lowest concentrations are found in early morning and the highest in the afternoon.

The most pronounced diurnal variation is found at the rural sites in Central Europe e.g. sites in Austria, Switzerland, most of the German sites and Ispra in Italy. Typical for those sites is a more marked peak in the diurnal cycle with a characteristic maximum around mid-afternoon. The pronounced diurnal peak during the summer months is due to the diurnal cycle of the mixing height and photochemical generation of ozone during daytime. During the night, more stable atmospheric conditions and nocturnal inversions prevent the vertical mixing and the transport of ozone from the free troposphere into the boundary layer. A weaker diurnal variation is observed at the coastal and island stations and at the remote sites in Norway and Sweden. Mace Head, situated on the west coast of Ireland, has roughly the same average concentrations as the rural sites in Central Europe but almost no diurnal variation due to remoteness from source areas and prevailing westerly winds. Zeppelin mountain in Spitsbergen shows little to no diurnal variation. Elevated sites like Chaumont and Krvavec show a weaker diurnal cycle and the average concentration level is also high, due to influence of air from the free troposphere.

9. Update

The data compiled in this report represent the quality assured and quality controlled data at present. If errors are detected in the future, the data will be corrected in the database. It is important that users make certain they have access to the most recent version of the data. For the data presented here, the latest alteration was August 15th, 2018.

All EMEP measurement data can be downloaded online at http://ebas.nilu.no or sent upon request to annehj@nilu.no. Information on EMEP and the measurement network are available at http://www.emep.int and http://www.nilu.no/projects/ccc.

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A large number of co-workers in participating countries have been involved in the many steps of collection of EMEP's measurement data. A list of participating institutes can be seen below. The staff at CCC wishes to express their gratitude and appreciation for continued good co-operation and efforts.

Closer at home the secretarial work, and far beyond, has been performed by Berit Modalen. Ann Mari Fjæraa, Rita Larsen Våler and Mona Waagsbø have been very helpful with data flow and database maintenance.

12. List of participating institutions

Armenia	Environmental Impact Monitoring Centre
Austria	Umweltbundesamt Provincial Government of Tyrol Provincial Government of Carinthia Environment Institute Vorarlberg Provincial Government Styria Provincial Government Salzburg Provincial Government Lower Austria
Belgium	CELINE – IRCEL
Bulgaria	Executive Environment Agency
Commission of the European Communities	Joint Research Center. Ispra Establishment
Cyprus	Ministry of Labour and Social Insurance
Czech Republic	Czech Hydrometeorological Institute
Denmark	Department of Environmental Science, Aarhus University
Estonia	Estonian Environmental Research Laboratory Ltd.
Finland	Finnish Meteorological Institute (FMI)
France	l' Ecole des Mines de Douai
Germany	Umweltbundesamt
Greece	Environmental Chemical Processes Laboratory, University of Crete Ministry of Environmental Physical Planning and Public Works
Hungary	Meteorological Service, Institute for Atmospheric Physics, Dep. for Air Chemistry
Ireland	Environmental Protection Agency (EPA) Ricardo – AEA
Italy	CNR-ISAC
Latvia	Latvian Environment, Geology and Meteorology Agency
Lithuania	Center for Physical Sciences and Technology
Macedonia	Ministry of Environment and Physical Planning
Malta	University of Malta
Netherlands	National Institute for Public Health and Environmental Protection (RIVM)
Norway	Norwegian Institute for Air Research (NILU)
Poland	Institute of Meteorology and Water Management Institute of Environmental Protection
Portugal	Instituto de Meteorologica
Romania	National Environmental Protection Agency
Slovakia	Slovak Hydrometeorological Institute
Slovenia	Slovenian Environment Agency
Spain	Dirección General de Calidad y Evaluacíon Ambiental
Sweden	Swedish Environmental Research Institute (IVL)
Switzerland	Swiss Federal Laboratory of Testing Materials and Research (EMPA)
United Kingdom	Ricardo – AEA

Annex 1

Concentration summaries and episodes, tables and figures

Table 1.1: Number of hours (h) and days (d) exceeding 120, 150, 180 and 200 μg/m³ and maximum concentrations in 2016.

Code	Station	Total		>120		>150		>180		>200		Max concentrations	
		hours	days	hours	days	hours	days	hours	days	hours	days	μg/m³	day(s)
AT0002R	Illmitz	8237	363	215	52	1	1	0	0	0	0	160.0	2016-09-01
AT0005R	Vorhegg	8256	363	32	12	0	0	0	0	0	0	141.5	2016-06-29
AT0030R	Pillersdorf bei Retz	8286	366	57	18	0	0	0	0	0	0	137.7	2016-09-10
AT0032R	Sulzberg	8393	366	379	51	10	3	0	0	0	0	167.0	2016-07-08
AT0034G	Sonnblick	4447	193	210	31	1	1	0	0	0	0	151.7	2016-06-23
AT0034G	Sonnblick	3602	158	427	44	0	0	0	0	0	0	146.9	2016-05-14
AT0038R	Gerlitzen	8407	366	479	59	1	1	0	0	0	0	153.2	2016-07-23
AT0040R	Masenberg	8387	366	167	31	0	0	0	0	0	0	135.9	2016-09-10
AT0041R	Haunsberg	8321	365	168	28	7	3	0	0	0	0	161.0	2016-06-24
AT0042R	Heidenreichstein	8392	366	119	30	0	0	0	0	0	0	138.9	2016-09-15
AT0043R	Forsthof	8285	365	234	46	5	2	0	0	0	0	175.6	2016-06-08
AT0045R	Dunkelsteinerwald	8365	366	161	40	3	2	0	0	0	0	157.6	2016-09-14
AT0046R	Gänserndorf	8360	366	182	48	1	1	0	0	0	0	153.0	2016-09-16
AT0047R	Stixneusiedl	8397	366	130	29	0	0	0	0	0	0	147.5	2016-06-08
AT0048R	Zoebelboden	8358	366	99	19	0	0	0	0	0	0	147.7	2016-07-08
AT0049R	Grebenzen bei St. Lamprecht	8366	366	190	36	0	0	0	0	0	0	144.3	2016-07-01
AT0050R	Graz Lustbuehel	8364	366	30	11	0	0	0	0	0	0	138.5	2016-09-10
BE0001R	Offagne	8393	363	75	17	2	1	0	0	0	0	155.0	2016-08-26
BE0032R	Eupen	8421	363	81	18	6	1	3	1	2	1	211.5	2016-08-26
BE0035R	Vezin	8441	363	94	20	8	1	5	1	0	0	199.0	2016-08-26
BG0053R	Rojen peak	7437	328	358	45	10	4	0	0	0	0	174.3	2016-08-01
CH0001G	Jungfraujoch	8494	366	28	4	5	1	1	1	0	0	180.4	2016-05-05
CH0002R	Payerne	8719	366	143	32	9	2	0	0	0	0	164.8	2016-08-27
CH0003R	Tänikon	8725	366	162	38	9	5	0	0	0	0	174.3	2016-08-25
CH0004R	Chaumont	8565	362	441	43	20	5	0	0	0	0	158.7	2016-08-25
CH0005R	Rigi	8725	366	364	51	2	2	0	0	0	0	152.9	2016-08-26
CY0002R	Ayia Marina	8200	351	776	117	6	4	0	0	0	0	168.0	2016-08-25
CZ0001R	Svratouch	8141	362	232	33	2	2	0	0	0	0	152.6	2016-06-24
CZ0003R	Kosetice	8351	366	277	46	0	0	0	0	0	0	146.4	2016-09-09
CZ0003R	Kosetice	8073	340	319	45	0	0	0	0	0	0	148.6	2016-07-25
CZ0005R	Churanov	8560	365	146	24	0	0	0	0	0	0	141.0	2016-08-28

Table 1.1, cont.

Code	Station	Total		>120		>150		>180		>200		Max concentrations	
		hours	days	hours	days	hours	days	hours	days	hours	days	µg/m³	day(s)
DE0001R	Westerland	7596	334	77	15	1	1	0	0	0	0	152.0	2016-08-26
DE0002R	Waldhof	8237	362	159	32	23	6	1	1	0	0	185.3	2016-08-26
DE0003R	Schauinsland	8055	356	547	50	72	13	0	0	0	0	173.0	2016-09-13
DE0007R	Neuglobsow	8257	366	75	18	3	1	0	0	0	0	167.6	2016-08-28
DE0008R	Schmücke	8341	366	272	30	6	3	0	0	0	0	156.3	2016-08-27
DE0009R	Zingst	8338	365	48	12	6	1	2	1	0	0	182.7	2016-08-26
DK0005R	Keldsnor	7935	364	39	11	2	1	0	0	0	0	168.7	2016-08-26
DK0010G	Villum Research Station, Station Nord	7747	357	0	0	0	0	0	0	0	0	91.3	2016-02-26
DK0012R	Risoe	7935	364	39	11	2	1	0	0	0	0	168.7	2016-08-26
DK0031R	Ulborg	7671	355	62	11	0	0	0	0	0	0	144.6	2016-05-11
EE0009R	Lahemaa	8759	366	64	12	0	0	0	0	0	0	132.0	2016-05-21
ES0001R	San Pablo de los Montes	8622	365	395	65	4	3	0	0	0	0	151.7	2016-08-04
ES0005R	Noya	8567	365	275	33	72	12	20	4	11	4	228.3	2016-08-12
ES0006R	Mahón	8483	361	365	50	0	0	0	0	0	0	145.1	2016-07-11
ES0007R	Víznar	8566	362	367	72	4	3	0	0	0	0	156.7	2016-07-28
ES0008R	Niembro	8533	363	38	5	3	1	0	0	0	0	169.0	2016-07-18
ES0009R	Campisabalos	8615	366	61	15	3	2	0	0	0	0	160.0	2016-07-29
ES0010R	Cabo de Creus	8663	366	33	11	0	0	0	0	0	0	137.6	2016-09-02
ES0011R	Barcarrota	8663	366	0	0	0	0	0	0	0	0	115.5	2016-07-08
ES0012R	Zarra	8676	366	762	107	14	6	0	0	0	0	160.4	2016-08-04
ES0013R	Penausende	8679	366	44	10	1	1	0	0	0	0	151.9	2016-08-13
ES0014R	Els Torms	8663	366	189	46	0	0	0	0	0	0	146.9	2016-06-09
ES0016R	O Saviñao	8679	366	96	17	13	6	0	0	0	0	175.9	2016-08-12
ES0017R	Doñana	8521	363	107	29	1	1	0	0	0	0	152.2	2016-09-05
FI0009R	Utö	8741	366	26	8	0	0	0	0	0	0	132.9	2016-06-25
FI0018R	Virolahti III	8745	366	25	8	0	0	0	0	0	0	137.4	2016-05-05
FI0022R	Oulanka	8720	366	0	0	0	0	0	0	0	0	119.0	2016-03-30
FI0037R	Ähtäri II	8758	366	20	4	0	0	0	0	0	0	126.6	2016-05-05
FI0096G	Pallas (Sammaltunturi)	8605	363	0	0	0	0	0	0	0	0	116.5	2016-04-30

Table 1.1, cont.

Code	Station	Total		>120		>150		>180		>200		Max concentrations	
		hours	days	hours	days	hours	days	hours	days	hours	days	µg/m³	day(s)
FR0008R	Donon	8716	365	76	13	5	2	0	0	0	0	163.6	2016-08-25
FR0009R	Revin	8740	366	97	17	5	1	0	0	0	0	177.6	2016-08-26
FR0010R	Morvan	8202	348	119	17	3	2	0	0	0	0	155.6	2016-09-13
FR0013R	Peyrusse Vieille	8153	341	63	15	0	0	0	0	0	0	139.7	2016-06-21
FR0014R	Montandon	8636	364	89	18	0	0	0	0	0	0	149.7	2016-08-27
FR0015R	La Tardière	8590	364	41	7	0	0	0	0	0	0	149.7	2016-08-26
FR0016R	Le Casset	8594	360	288	37	0	0	0	0	0	0	143.7	2016-05-14
FR0017R	Montfranc	8612	362	87	13	0	0	0	0	0	0	145.7	2016-08-27
FR0018R	La Coulonche	8703	366	56	13	1	1	0	0	0	0	161.6	2016-08-25
FR0019R	Pic du Midi	8574	360	390	72	6	4	0	0	0	0	161.6	2016-05-04
FR0023R	Saint-Nazaire-le-Désert	8486	364	205	46	15	6	0	0	0	0	173.6	2016-06-23
FR0025R	Verneuil	8682	365	78	14	0	0	0	0	0	0	143.7	2016-08-17
FR0030R	Puy de Dôme	8309	362	240	35	8	2	0	0	0	0	171.6	2016-08-24
GB0002R	Eskdalemuir	8612	362	21	6	0	0	0	0	0	0	146.3	2016-05-08
GB0006R	Lough Navar	8434	356	8	3	0	0	0	0	0	0	127.2	2016-05-12
GB0013R	Yarner Wood	8243	348	10	4	0	0	0	0	0	0	127.5	2016-07-19
GB0014R	High Muffles	8014	338	85	12	13	2	0	0	0	0	173.4	2016-05-08
GB0015R	Strath Vaich Dam	7570	317	50	4	0	0	0	0	0	0	145.4	2016-05-11
GB0031R	Aston Hill	8208	356	79	14	14	3	0	0	0	0	164.4	2016-05-12
GB0033R	Bush	7814	328	0	0	0	0	0	0	0	0	116.2	2016-05-10
GB0035R	Great Dun Fell	6943	292	80	10	7	3	0	0	0	0	169.0	2016-05-08
GB0037R	Ladybower Res.	8323	350	27	5	1	1	0	0	0	0	150.2	2016-07-19
GB0038R	Lullington Heath	8503	362	18	10	0	0	0	0	0	0	136.1	2016-08-27
GB0039R	Sibton	8673	365	48	9	8	3	2	1	0	0	181.5	2016-07-19
GB0043R	Narberth	8701	365	13	4	0	0	0	0	0	0	127.8	2016-05-08
GB0045R	Wicken Fen	8600	364	41	10	2	1	0	0	0	0	157.4	2016-07-19
GB0048R	Auchencorth Moss	8408	354	1	1	0	0	0	0	0	0	123.1	2016-07-19
GB0049R	Weybourne	8661	362	45	8	2	1	0	0	0	0	158.6	2016-07-19
GB0050R	St. Osyth	8325	352	32	8	5	2	1	1	0	0	194.0	2016-07-19
GB0052R	Lerwick	8602	362	8	3	0	0	0	0	0	0	124.5	2016-05-10
GB0053R	Charlton Mackrell	8678	366	0	0	0	0	0	0	0	0	117.9	2016-05-06
GB1055R	Chilbolton Observatory	8269	349	41	9	0	0	0	0	0	0	141.6	2016-08-17

Table 1.1, cont.

Code	Station	Total		>120		>150		>180		>200		Max concentrations	
		hours	days	hours	days	hours	days	hours	days	hours	days	µg/m³	day(s)
GR0001R	Aliartos	7883	331	418	77	12	3	0	0	0	0	180.0	2016-07-31
GR0002R	Finokalia	4818	270	339	57	1	1	0	0	0	0	150.6	2016-06-20
HU0002R	K-puszta	7809	328	41	9	0	0	0	0	0	0	135.6	2016-05-21
HU0003R	Farkasfa	6573	278	13	5	0	0	0	0	0	0	127.9	2016-04-22
IE0001R	Valentia Observatory	8516	358	10	5	0	0	0	0	0	0	123.7	2016-10-17
IE0031R	Mace Head	8780	366	7	2	0	0	0	0	0	0	128.4	2016-05-09
IT0004R	Ispra	7961	340	378	73	125	33	24	8	4	2	213.2	2016-07-19
IT0009R	Mt Cimone	7554	355	997	107	39	14	1	1	0	0	189.8	2016-07-19
IT0018R	Lampedusa	7553	325	122	29	0	0	0	0	0	0	145.7	2016-09-25
LT0015R	Preila	8613	365	47	13	0	0	0	0	0	0	138.9	2016-05-10
LV0010R	Rucava	5994	260	9	2	0	0	0	0	0	0	135.8	2016-06-24
LV0016R	Zoseni	6511	275	2	1	0	0	0	0	0	0	126.4	2016-05-21
MK0007R	Lazaropole	8367	357	654	105	5	3	0	0	0	0	156.0	2016-05-24
MT0001R	Giordan lighthouse	7974	339	154	49	0	0	0	0	0	0	145.7	2016-07-20
NL0007R	Eibergen	8613	366	141	25	20	7	0	0	0	0	174.3	2016-08-24
NL0009R	Kollumerwaard	8607	366	31	8	0	0	0	0	0	0	147.2	2016-08-25
NL0010R	Vredepeel	8402	360	153	31	30	9	1	1	0	0	184.1	2016-07-19
NL0091R	De Zilk	8502	361	93	15	26	7	2	1	0	0	190.6	2016-07-19
NL0644R	Cabauw Wielsekade	8569	364	90	19	23	5	4	1	0	0	188.5	2016-07-19
NO0002R	Birkenes II	8717	366	35	5	0	0	0	0	0	0	135.2	2016-05-09
NO0015R	Tustervatn	8237	357	0	0	0	0	0	0	0	0	119.4	2016-05-01
NO0039R	Kårvatn	8716	366	21	2	0	0	0	0	0	0	140.3	2016-05-08
NO0042G	Zeppelin mountain (Ny-Ålesund)	8222	347	0	0	0	0	0	0	0	0	106.0	2016-05-17
NO0043R	Prestebakke	8745	366	34	6	0	0	0	0	0	0	136.2	2016-08-26
NO0052R	Sandve	8542	359	33	4	0	0	0	0	0	0	136.6	2016-05-09
NO0056R	Hurdal	8453	355	38	6	0	0	0	0	0	0	131.8	2016-05-09
PL0002R	Jarczew	8753	366	33	10	0	0	0	0	0	0	139.3	2016-06-30
PL0003R	Sniezka	8773	366	219	42	0	0	0	0	0	0	149.7	2016-05-26
PL0004R	Leba	8779	366	50	10	2	1	0	0	0	0	158.8	2016-06-24
PL0005R	Diabla Gora	8650	365	54	10	0	0	0	0	0	0	133.6	2016-07-02

Table 1.1, cont.

Code	Station	Total		>120		>150		>180		>200		Max concentrations	
		hours	days	hours	days	hours	days	hours	days	hours	days	μg/m³	day(s)
RS0005R	Kamenicki vis	7084	301	302	51	2	1	0	0	0	0	152.0	2016-07-09
SE0005R	Bredkälen	8747	366	17	2	0	0	0	0	0	0	134.1	2016-05-09
SE0012R	Aspvreten	7937	354	7	3	0	0	0	0	0	0	122.6	2016-05-10
SE0013R	Esrange	8771	366	2	1	0	0	0	0	0	0	121.0	2016-05-01
SE0014R	Råö	8731	366	30	10	0	0	0	0	0	0	136.7	2016-08-26
SE0018R	Asa	8622	363	42	8	2	1	0	0	0	0	177.9	2016-08-26
SE0019R	Östad	8755	366	29	5	0	0	0	0	0	0	144.2	2016-08-26
SE0020R	Hallahus	8666	364	69	15	3	1	0	0	0	0	159.6	2016-08-26
SE0032R	Norra-Kvill	8731	366	66	9	3	1	0	0	0	0	174.2	2016-08-26
SE0035R	Vindeln	8754	366	8	1	0	0	0	0	0	0	126.2	2016-05-08
SE0039R	Grimsö	8557	359	48	8	0	0	0	0	0	0	140.4	2016-08-26
SI0008R	Iskrba	8359	366	117	28	0	0	0	0	0	0	143.9	2016-07-30
SI0031R	Zarodnje	8257	366	156	31	0	0	0	0	0	0	145.7	2016-07-12
SI0032R	Krvavec	8230	366	648	82	14	4	0	0	0	0	163.0	2016-07-22
SI0033R	Kovk	8263	361	239	45	0	0	0	0	0	0	145.7	2016-05-22
SK0002R	Chopok	7207	309	373	56	0	0	0	0	0	0	143.0	2016-07-11
SK0004R	Stará Lesná	8553	366	28	8	0	0	0	0	0	0	137.0	2016-07-11
SK0006R	Starina	6368	279	44	15	0	0	0	0	0	0	142.0	2016-06-09
SK0007R	Topolniky	8194	351	62	15	0	0	0	0	0	0	144.0	2016-06-08

Table 1.2: Percentiles of hourly ozone values April–September 2016.

Code	Station	25%	50%	75%	90%	95%	98%	99%	Data capture
AT0002R	Illmitz	54.5	71.4	92.8	111.5	120.3	130.0	134.7	94.8
AT0005R	Vorhegg	54.9	68.8	84.0	94.2	102.2	110.4	117.5	92.6
AT0030R	Pillersdorf bei Retz	56.1	70.4	87.8	102.8	110.1	117.3	122.7	93.8
AT0032R	Sulzberg	75.0	89.2	103.8	118.1	126.9	135.9	139.3	95.6
AT0034G	Sonnblick	88.6	99.3	109.4	119.4	123.9	128.8	132.5	52.7
AT0034G	Sonnblick	102.5	112.3	120.7	127.7	133.7	137.4	138.5	34.2
AT0038R	Gerlitzen	90.0	100.8	111.5	120.7	126.3	133.1	137.9	95.7
AT0040R	Masenberg	77.4	89.6	102.0	112.3	118.5	123.8	126.5	95.4
AT0041R	Haunsberg	67.8	80.8	95.4	110.5	117.9	128.5	134.7	95.2
AT0042R	Heidenreichstein	48.5	70.0	89.8	106.0	113.7	122.1	127.3	95.5
AT0043R	Forsthof	66.4	82.0	98.8	113.9	121.5	128.9	134.1	93.3
AT0045R	Dunkelsteinerwald	43.9	63.0	83.6	103.4	115.2	126.2	132.0	95.4
AT0046R	Gänserndorf	47.3	65.9	89.2	109.5	118.6	125.9	130.9	95.5
AT0047R	Stixneusiedl	51.3	68.5	89.2	107.0	115.1	123.7	128.9	95.6
AT0048R	Zoebelboden	69.3	82.0	93.4	104.8	112.7	121.7	125.5	95.2
AT0049R	Grebenzen bei St. Lamprecht	83.2	93.6	104.0	113.9	118.9	124.7	127.9	95.6
AT0050R	Graz Lustbuehel	52.1	72.9	91.1	104.0	109.5	115.7	118.7	95.4
BE0001R	Offagne	39.0	58.0	76.0	95.0	108.0	118.5	126.0	96.8
BE0032R	Eupen	38.0	55.5	75.0	95.0	109.0	120.0	125.5	97.5
BE0035R	Vezin	29.5	48.5	69.0	90.5	105.5	121.7	130.5	97.4
BG0053R	Rojen peak	87.5	97.3	108.9	120.5	127.3	137.3	142.1	74.1
CH0001G	Jungfraujoch	72.0	78.9	86.4	94.3	99.2	106.9	112.8	96.6
CH0002R	Payerne	41.3	63.0	85.6	102.4	113.4	126.3	132.7	99.3
CH0003R	Tänikon	43.8	61.5	83.6	103.1	114.9	129.4	136.1	99.4
CH0004R	Chaumont	74.4	88.5	103.9	120.4	129.8	139.1	144.1	97.7
CH0005R	Rigi	73.9	87.5	101.2	117.7	126.2	133.4	138.0	99.4
CY0002R	Ayia Marina	95.2	106.4	115.9	123.7	128.5	134.2	137.9	98.2
CZ0001R	Svratouch	70.4	85.6	100.7	113.3	121.3	127.1	131.3	94.3
CZ0003R	Kosetice	61.8	80.0	98.4	114.6	122.8	131.0	135.0	95.0
CZ0003R	Kosetice	72.6	87.8	105.1	118.1	125.3	132.1	136.2	87.7
CZ0003R	Kosetice	60.5	78.2	96.2	112.2	119.9	127.0	130.7	91.6
CZ0005R	Churanov	67.4	81.0	96.1	110.3	117.7	124.1	128.7	97.1
DE0001R	Westerland	63.0	75.0	88.3	97.6	108.0	119.0	127.0	93.4
DE0002R	Waldhof	43.1	63.9	82.3	102.7	117.4	129.8	140.7	92.2
DE0003R	Schauinsland	76.4	89.6	106.0	126.0	137.0	148.0	158.0	94.8
DE0007R	Neuglobsow	41.5	63.3	80.7	97.2	109.2	119.1	124.4	93.2
DE0008R	Schmücke	65.5	79.0	96.2	113.4	123.9	134.8	140.6	95.2
DE0009R	Zingst	57.5	70.3	82.8	94.5	103.7	114.7	121.2	95.3
DK0005R	Keldsnor	53.4	65.1	77.3	88.3	97.3	112.0	120.1	89.6
DK0010G	Villum Research Station, Station Nord	43.8	52.9	62.2	70.7	77.4	82.7	86.1	87.6
DK0012R	Risoe	53.4	65.1	77.3	88.3	97.3	112.0	120.1	89.6
DK0031R	Ulborg	54.4	65.6	78.4	90.8	103.1	117.6	125.5	89.6
EE0009R	Lahemaa	40.0	57.0	73.0	89.0	103.0	117.0	123.0	99.5
ES0001R	San Pablo de los Montes	80.7	93.8	107.6	119.4	125.9	134.9	138.8	97.3
ES0005R	Noya	52.6	70.2	89.0	109.6	125.8	147.1	164.2	98.0
ES0006R	Mahón	82.6	95.9	108.5	118.8	125.4	131.5	135.3	94.5
ES0007R	Víznar	83.5	93.8	106.2	117.6	124.3	131.8	137.3	96.3
ES0008R	Niembro	62.0	74.3	87.3	97.8	103.9	111.7	117.7	99.0
ES0009R	Campisabalos	59.2	76.6	89.1	99.8	106.1	115.9	121.9	98.5
ES0010R	Cabo de Creus	67.9	79.0	89.3	99.4	105.7	112.2	117.5	98.5
ES0011R	Barcarrota	38.9	56.6	74.8	85.9	92.1	98.7	101.8	98.5
ES0012R	Zarra	91.4	103.5	114.8	125.5	131.6	137.5	142.8	98.7
ES0013R	Penausende	62.9	76.0	88.7	102.5	109.0	115.7	120.3	98.7
ES0014R	Els Torms	74.6	89.3	102.2	113.6	119.1	124.1	129.1	98.5
ES0016R	O Saviñao	43.2	60.2	76.3	89.9	102.6	122.1	132.8	98.5
ES0017R	Doñana	55.0	74.7	90.9	105.3	113.9	121.0	125.3	98.8
FI0009R	Utö	60.8	70.3	81.2	92.7	100.1	110.0	116.6	99.6
FI0018R	Virolahti III	38.7	56.3	72.6	86.4	95.0	108.9	115.6	99.6
FI0022R	Oulanka	44.3	57.6	74.4	84.1	90.7	97.6	103.2	99.7
FI0037R	Ähtäri II	38.7	53.6	69.2	82.6	91.2	103.9	111.7	99.6
FI0096G	Pallas (Sammaltunturi)	53.7	65.3	80.3	87.6	93.5	104.5	109.1	97.9

Table 1.2, cont.

Code	Station	25%	50%	75%	90%	95%	98%	99%	Data capture
FR0008R	Donon	41.9	57.9	73.8	93.8	107.7	119.7	130.0	99.8
FR0009R	Revin	45.9	61.9	79.8	97.8	111.7	122.5	129.7	99.7
FR0010R	Morvan	47.9	65.8	85.8	101.8	111.7	123.7	129.7	93.8
FR0013R	Peyrusse Vieille	57.9	73.8	87.8	101.8	111.7	117.7	123.7	99.8
FR0014R	Montandon	43.9	61.9	79.8	97.8	109.7	121.7	127.7	97.7
FR0015R	La Tardière	45.9	63.9	79.8	93.8	101.8	111.7	119.7	98.3
FR0016R	Le Casset	85.8	95.8	105.8	115.7	121.7	127.7	129.7	95.8
FR0017R	Montfranc	67.8	81.8	93.8	107.7	113.7	121.1	123.7	99.4
FR0018R	La Coulonche	53.9	67.8	83.8	95.8	105.8	115.7	123.7	98.4
FR0019R	Pic du Midi	85.8	99.8	109.7	119.7	125.7	131.9	139.7	95.5
FR0023R	Saint-Nazaire-le-Désert	49.9	75.8	93.8	111.7	119.7	129.7	137.7	97.2
FR0025R	Verneuil	37.9	59.9	79.8	95.8	107.7	119.7	125.7	99.0
FR0030R	Puy de Dôme	75.8	89.8	101.8	115.7	121.7	127.7	131.7	94.7
GB0002R	Eskdalemuir	41.3	54.3	70.0	81.7	90.2	104.6	114.5	97.4
GB0006R	Lough Navar	30.4	44.9	61.5	79.1	86.6	95.2	101.8	96.2
GB0013R	Yarner Wood	41.3	52.6	67.8	80.5	88.2	96.8	108.0	95.1
GB0014R	High Muffles	44.8	59.3	76.0	89.6	98.5	119.8	127.9	99.9
GB0015R	Strath Vaich Dam	55.4	67.6	82.8	92.3	99.3	111.3	131.9	72.7
GB0031R	Aston Hill	47.7	58.1	79.2	95.7	107.3	120.0	128.3	91.3
GB0033R	Bush	47.1	58.6	73.8	84.2	91.3	101.5	106.0	78.7
GB0035R	Great Dun Fell	42.3	51.8	69.7	86.0	98.4	119.4	130.9	98.9
GB0037R	Ladybower Res.	43.2	55.6	67.2	79.2	89.2	102.1	112.8	99.7
GB0038R	Lullington Heath	43.5	57.9	70.8	83.6	92.3	105.3	112.7	94.8
GB0039R	Sibton	40.0	56.3	71.2	83.5	91.7	107.7	123.0	97.7
GB0043R	Narberth	43.3	55.5	72.0	84.5	90.6	102.2	109.9	98.8
GB0045R	Wicken Fen	33.6	52.9	71.3	83.2	92.4	111.0	119.6	97.9
GB0048R	Auchencorth Moss	43.8	54.0	68.0	79.0	84.9	95.5	100.6	91.9
GB0049R	Weybourne	51.7	65.7	80.9	91.9	98.1	107.3	121.4	97.3
GB0050R	St. Osyth	38.7	55.0	69.3	82.5	89.9	103.6	116.9	90.6
GB0052R	Lerwick	55.5	66.5	78.9	87.4	91.8	98.2	106.8	98.6
GB0053R	Charlton Mackrell	42.6	56.0	71.3	86.3	93.0	100.3	105.5	98.3
GB1055R	Chilbolton Observatory	35.8	51.6	68.1	84.5	93.9	106.1	118.8	98.8
GR0001R	Aliartos	53.0	84.0	107.0	120.0	127.0	134.0	138.3	99.5
GR0002R	Finokalia	93.5	102.6	112.7	122.3	129.1	136.9	139.1	55.9
HU0002R	K-puszta	32.3	60.0	84.5	100.5	108.0	115.9	121.2	79.8
HU0003R	Farkasfa	41.4	65.1	85.1	99.4	105.8	111.7	116.0	77.0
IE0001R	Valentia Observatory	52.6	63.0	78.8	90.3	95.3	99.7	103.6	93.9
IE0031R	Mace Head	57.7	67.7	81.3	92.4	97.3	102.9	109.1	99.9
IT0004R	Ispra	42.9	65.6	91.4	117.0	134.8	161.1	173.2	95.7
IT0009R	Mt Cimone	98.8	109.2	120.5	130.1	136.3	144.2	150.8	86.8
IT0018R	Lampedusa	86.4	96.2	105.2	111.9	116.7	123.1	127.2	84.9
LT0015R	Preila	51.0	66.7	83.0	96.1	104.7	114.6	119.6	97.9
LV0010R	Rucava	41.0	60.3	75.4	88.8	98.9	108.7	113.9	77.5
LV0016R	Zoseni	38.6	55.4	70.0	82.8	91.5	100.5	104.6	88.7
MK0007R	Lazaropole	69.0	90.0	110.0	123.0	129.0	134.0	139.0	99.0
MT0001R	Giordan lighthouse	87.0	97.4	106.3	113.7	117.5	122.1	125.3	97.7
NL0007R	Eibergen	29.4	47.9	70.5	91.3	109.3	130.8	142.4	97.9
NL0009R	Kollumerwaard	38.4	56.9	71.8	83.1	91.9	106.7	116.4	98.2
NL0010R	Vredepeel	33.9	51.9	72.6	92.8	112.6	133.0	143.7	97.3
NL0091R	De Zilk	42.6	61.6	77.0	90.2	99.6	122.5	142.0	97.6
NL0644R	Cabauw Wielsekade	33.5	51.6	70.2	86.7	100.9	121.4	139.3	96.6
NO0002R	Birkenes II	47.4	61.0	76.4	87.1	93.3	107.7	117.3	99.4
NO0015R	Tustervatn	49.4	60.7	77.0	89.4	98.2	109.5	113.0	88.2
NO0039R	Kårvatn	25.4	46.1	66.9	83.0	89.3	100.4	113.0	99.3
NO0042G	Zeppelin mountain (Ny-Ålesund)	54.8	63.0	72.5	83.4	87.9	94.9	97.9	96.9
NO0043R	Prestebakke	48.7	61.2	74.7	86.3	94.7	106.2	115.3	99.6
NO0052R	Sandve	51.5	62.4	74.6	84.9	91.5	110.9	118.9	95.5
NO0056R	Hurdal	43.0	56.8	72.1	83.4	90.4	100.8	117.1	99.4
PL0002R	Jarczew	35.1	54.3	75.4	94.2	104.7	112.1	117.4	99.3
PL0003R	Sniezka	76.0	88.4	102.9	114.3	120.1	126.1	129.5	99.8
PL0004R	Leba	54.3	69.0	82.4	94.0	103.0	112.8	121.9	99.9
PL0005R	Diabla Gora	42.2	62.2	78.7	94.0	104.4	115.0	122.1	99.3

Table 1.2, cont.

Code	Station	25%	50%	75%	90%	95%	98%	99%	Data capture
RS0005R	Kamenicki vis	79.8	94.8	108.0	117.0	123.0	129.0	133.7	96.3
SE0005R	Bredkälen	41.3	56.4	72.5	82.6	89.1	101.4	109.8	99.7
SE0012R	Aspvreten	36.9	55.2	70.2	83.6	91.0	103.2	110.3	86.0
SE0013R	Esrange	51.8	64.9	80.6	89.6	95.8	106.1	112.1	99.9
SE0014R	Råö	58.9	68.8	81.1	92.1	100.5	110.3	116.4	99.6
SE0018R	Asa	42.9	61.5	76.9	89.4	100.9	114.2	120.0	98.3
SE0019R	Östad	40.0	59.1	73.4	87.2	95.8	106.5	112.8	99.8
SE0020R	Hallahus	51.9	66.2	81.6	96.5	106.3	117.9	124.5	98.8
SE0032R	Norra-Kvill	58.4	70.8	82.8	96.0	106.1	117.5	123.4	99.7
SE0035R	Vindeln	36.9	55.4	71.4	82.9	89.2	96.2	104.1	99.7
SE0039R	Grimsö	44.6	59.1	73.0	87.0	95.9	112.0	120.9	99.5
SI0008R	Iskrba	14.8	60.1	90.4	108.3	115.5	121.7	126.5	95.1
SI0031R	Zarodnje	73.8	87.8	101.8	111.7	117.7	125.7	131.7	94.6
SI0032R	Krvavec	90.2	101.8	114.1	123.9	129.5	137.7	142.8	92.4
SI0033R	Kovk	77.8	91.8	105.8	115.7	121.7	127.7	133.7	93.5
SK0002R	Chopok	89.0	99.0	110.0	119.0	124.0	129.0	132.0	98.3
SK0004R	Stará Lesná	42.0	67.0	87.0	101.7	108.0	114.0	118.0	97.7
SK0006R	Starina	43.0	63.0	83.0	98.0	107.0	115.0	121.1	90.9
SK0007R	Topolniky	40.0	59.0	82.0	99.0	108.0	117.3	123.0	98.7

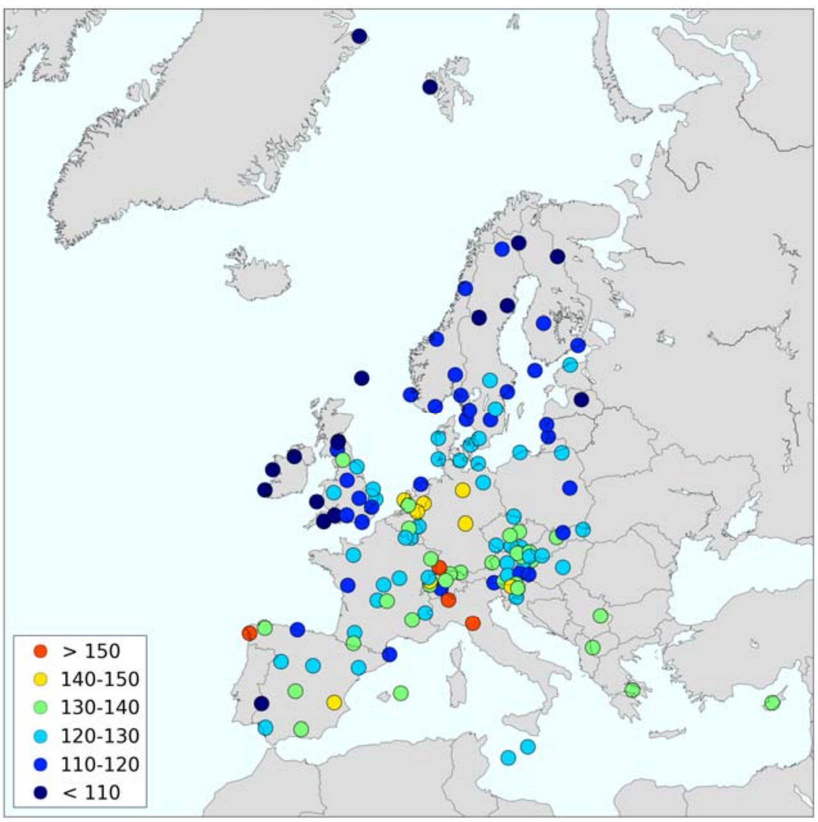


Figure 1.1: Ozone April–September 2016. 99-percentiles (µg/m³).

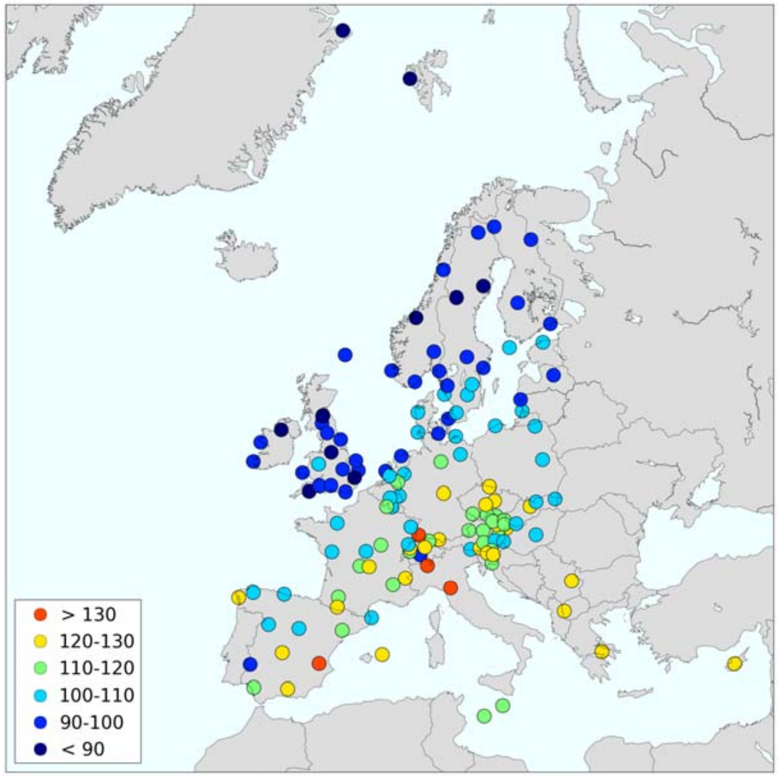


Figure 1.2: Ozone April–September 2016. 95-percentiles ($\mu g/m^3$).

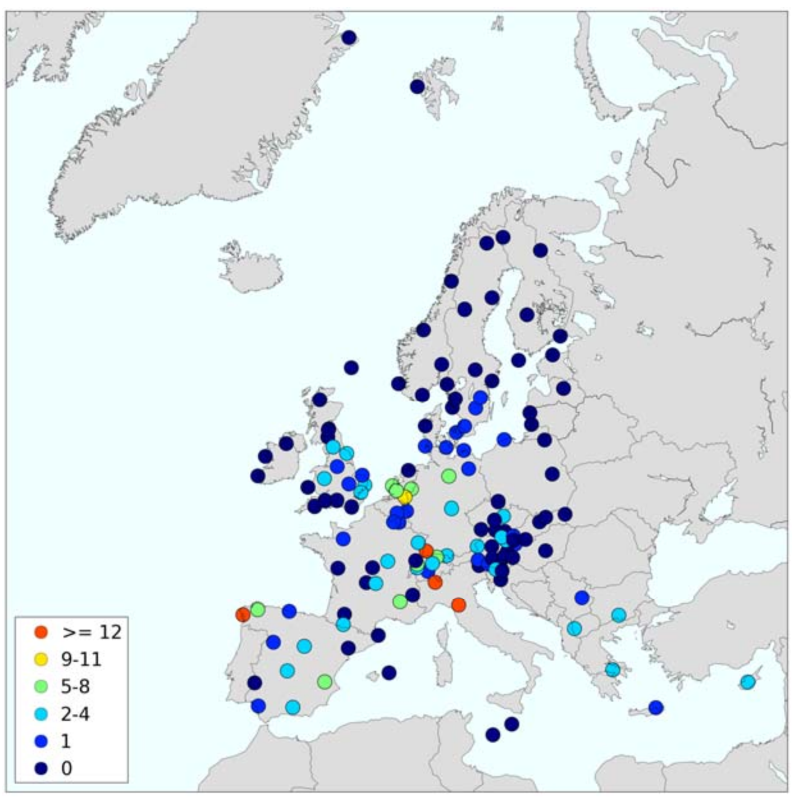


Figure 1.3: Number of days with ozone concentration above 150 $\mu g/m^3$.

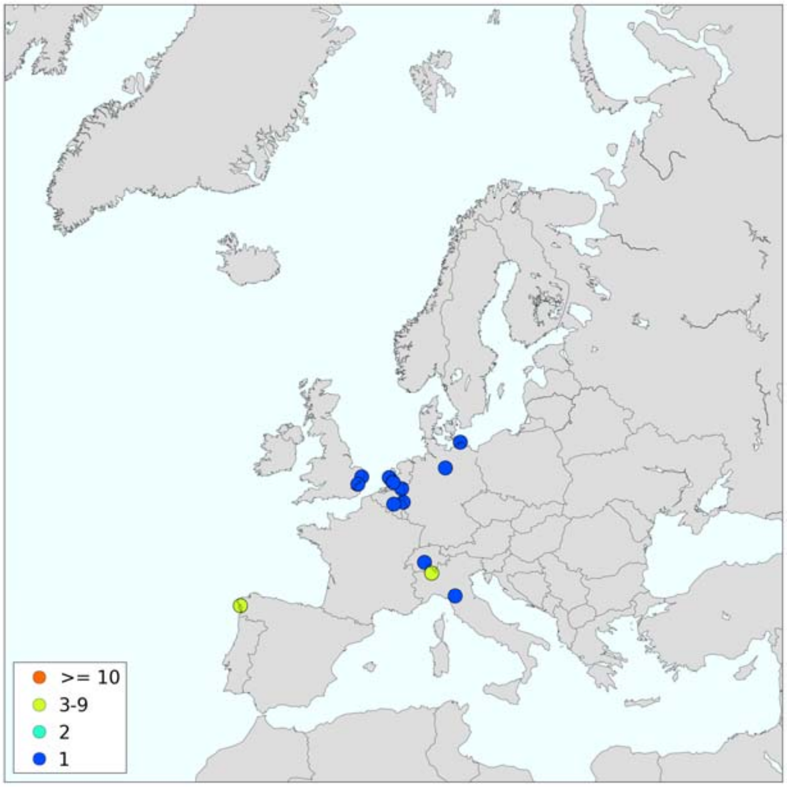


Figure 1.4: Number of exceedances of the threshold value of 180 μg/m^3. (Unit: number of days). Stations with zero exceedances are not shown.

Annex 2

AOT40, figures and tables

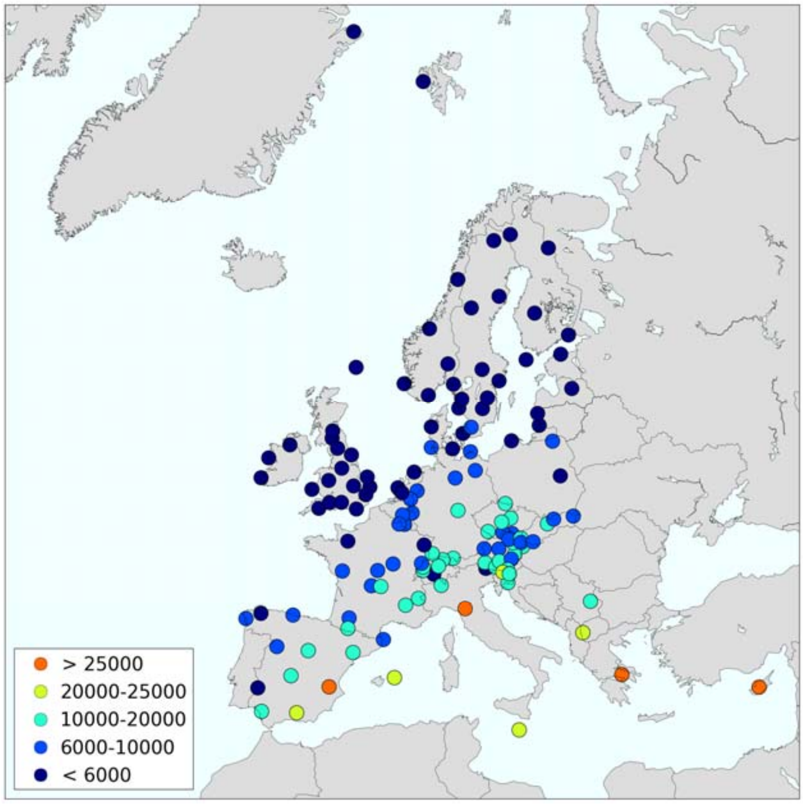


Figure 2.1: AOT40 (ppbh) April–September 2016 (daylight hours).

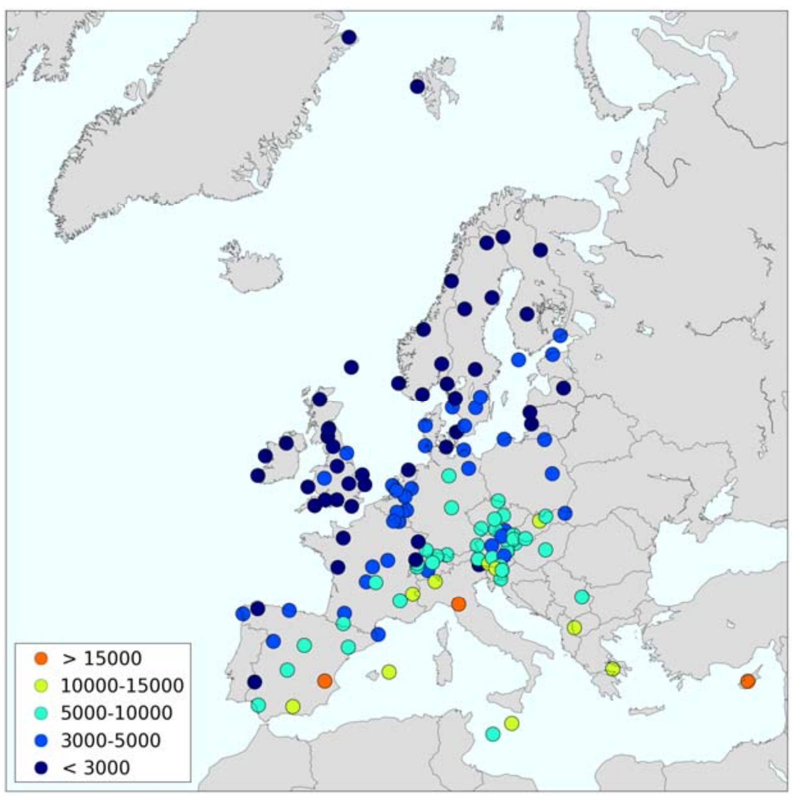


Figure 2.2: AOT40 (ppbh) May, June and July 2016 (daylight hours).

Table 2.1: AOT40 May-July and April–September 2016 (daylight hours).

Code	Station	May - July			April - September		
		AOT40	AOT40 corrected	Data capture	AOT40	AOT40 corrected	Data capture
AT0002R	Illmitz	7149.0	7631.9	93.7	10934.1	11776.5	92.8
AT0005R	Vorhegg	2678.7	2998.2	89.3	3644.4	4057.5	89.8
AT0030R	Pillersdorf bei Retz	4081.9	4447.6	91.8	6750.0	7364.0	91.7
AT0032R	Sulzberg	8163.3	8178.2	99.8	13426.0	13479.1	99.6
AT0034G	Sonnblick	5246.8	5515.5	95.1	9571.9	10130.0	94.5
AT0034G	Sonnblick	8883.7	9927.0	89.5	10964.6	14386.3	76.2
AT0038R	Gerlitzen	12090.2	12636.2	95.7	18710.8	19521.4	95.8
AT0040R	Masenberg	7057.9	7415.1	95.2	11931.1	12553.9	95.0
AT0041R	Haunsberg	5665.6	5970.6	94.9	8827.6	9298.8	94.9
AT0042R	Heidenreichstein	4963.1	5202.0	95.4	8429.3	8849.3	95.3
AT0043R	Forsthof	6430.1	6901.7	93.2	10346.1	11002.4	94.0
AT0045R	Dunkelsteinerwald	4515.9	4751.6	95.0	7751.7	8159.1	95.0
AT0046R	Gänserndorf	6185.4	6490.6	95.3	9950.1	10436.7	95.3
AT0047R	Stixneusiedl	5273.3	5518.5	95.6	8468.4	8864.6	95.5
AT0048R	Zoebelboden	4371.8	4724.6	92.5	6977.6	7462.8	93.5
AT0049R	Grebenzen bei St. Lamprecht	8149.4	8531.0	95.5	12841.1	13442.9	95.5
AT0050R	Graz Lustbuehel	3772.8	3982.6	94.7	6300.2	6622.1	95.1
BE0001R	Offagne	3470.2	3638.3	95.4	5991.8	6218.8	96.3
BE0032R	Eupen	3382.8	3496.8	96.7	5890.5	6079.4	96.9
BE0035R	Vezin	3492.2	3616.7	96.6	6111.8	6307.8	96.9
BG0053R	Rojen peak	5670.8	9334.6	60.8	13743.0	18141.8	75.8
CH0001G	Jungfraujoch	3414.5	3573.1	95.6	4337.8	4508.7	96.2
CH0002R	Payerne	5932.6	6019.8	98.6	11214.7	11388.4	98.5
CH0003R	Tänikon	6573.4	6633.6	99.1	11475.6	11635.8	98.6
CH0004R	Chaumont	6861.5	7040.1	97.5	14293.5	14728.4	97.0
CH0005R	Rigi	8031.9	8127.6	98.8	14171.6	14362.2	98.7
CY0002R	Ayia Marina	15158.9	15442.9	98.2	27066.8	27608.9	98.0
CZ0001R	Svratouch	7351.1	7639.8	96.2	13528.2	13946.3	97.0
CZ0003R	Kosetice	8953.0	9220.7	97.1	15980.6	16441.8	97.2
CZ0003R	Kosetice	9833.4	10009.5	98.2	15689.8	17876.9	87.8
CZ0005R	Churanov	6331.8	6440.2	98.3	11256.1	11360.6	99.1
DE0001R	Westerland	4619.7	4811.4	96.0	6958.3	7419.7	93.8
DE0002R	Waldhof	5697.5	6034.2	94.4	9016.2	9735.2	92.6
DE0003R	Schauinsland	7976.6	8402.8	94.9	15225.0	16030.1	95.0
DE0007R	Neuglobsow	4456.8	4986.7	89.4	7331.7	8040.4	91.2
DE0008R	Schmücke	5430.4	5733.2	94.7	9675.1	10239.7	94.5
DE0009R	Zingst	3917.4	4144.0	94.5	5749.6	6053.1	95.0
DK0005R	Keldsnor	2438.3	2543.0	95.9	3076.1	3226.0	95.4
DK0010G	Villum Research Station, Station Nord	126.1	137.0	92.1	126.6	138.6	91.4
DK0012R	Risoe	2387.2	2499.9	95.5	3019.1	3177.1	95.0
DK0031R	Ulborg	3027.8	3147.7	96.2	4017.4	4214.9	95.3
EE0009R	Lahemaa	3255.0	3288.9	99.0	3992.0	4019.2	99.3
ES0001R	San Pablo de los Montes	9450.6	9994.1	94.6	18664.9	19385.8	96.3
ES0005R	Noya	4262.0	4381.1	97.3	8590.4	8874.2	96.8
ES0006R	Mahón	11720.5	11896.6	98.5	20206.3	21662.6	93.3
ES0007R	Víznar	12898.5	13194.2	97.8	19904.8	20895.3	95.3
ES0008R	Niembro	3651.8	3719.8	98.2	6385.5	6523.9	97.9
ES0009R	Campisabalos	6379.8	6530.7	97.7	9834.5	10043.8	97.9
ES0010R	Cabo de Creus	4129.5	4247.5	97.2	7013.0	7201.8	97.4
ES0011R	Barcarrota	1980.2	2051.2	96.5	2727.7	2814.1	96.9
ES0012R	Zarra	16907.4	17237.3	98.1	28723.5	29267.7	98.1
ES0013R	Penausende	4693.0	4775.9	98.3	7715.9	7883.3	97.9
ES0014R	Els Torms	9496.4	9808.2	96.8	16867.0	17356.7	97.2
ES0016R	O Saviñao	1785.1	1831.6	97.5	4710.4	4824.3	97.6
ES0017R	Doñana	5730.3	5853.6	97.9	11255.2	11529.6	97.6
FI0009R	Utö	3479.1	3479.1	100.0	4047.8	4047.8	100.0
FI0018R	Virolahti III	3097.3	3097.3	100.0	3532.5	3532.5	100.0
FI0022R	Oulanka	1119.8	1119.8	100.0	1979.3	1979.3	100.0
FI0037R	Ähtäri II	2041.6	2041.6	100.0	2380.8	2380.8	100.0
FI0096G	Pallas (Sammaltunturi)	1496.5	1496.5	100.0	2384.9	2384.9	100.0

Table 2.1, cont.

Code	Station	May - July			April - September		
		AOT40	AOT40 corrected	Data capture	AOT40	AOT40 corrected	Data capture
FR0008R	Donon	1818.7	1826.9	99.5	4074.4	4090.5	99.6
FR0009R	Revin	3698.1	3721.6	99.4	6408.0	6449.3	99.4
FR0010R	Morvan	3162.0	3590.8	88.1	8109.1	8697.2	93.2
FR0013R	Peyrusse Vieille	4208.7	4220.3	99.7	8091.0	8119.1	99.7
FR0014R	Montandon	2771.0	2816.9	98.4	6894.1	7093.1	97.2
FR0015R	La Tardière	2884.9	2903.1	99.4	5967.6	6104.4	97.8
FR0016R	Le Casset	10152.8	10746.6	94.5	18458.1	19293.7	95.7
FR0017R	Montfranc	4558.9	4575.5	99.6	9612.4	9678.8	99.3
FR0018R	La Coulonche	2629.2	2705.8	97.2	5589.4	5714.0	97.8
FR0019R	Pic du Midi	9468.0	9880.9	95.8	16020.6	16827.9	95.2
FR0023R	Saint-Nazaire-le-Désert	7497.1	7579.7	98.9	14577.5	14811.1	98.4
FR0025R	Verneuil	3223.1	3288.3	98.0	7493.2	7589.8	98.7
FR0030R	Puy de Dôme	5864.2	6552.6	89.5	12281.5	13430.7	91.4
GB0002R	Eskdalemuir	2022.1	2143.1	94.4	2349.4	2427.9	96.8
GB0006R	Lough Navar	1234.3	1306.2	94.5	1592.5	1663.0	95.8
GB0013R	Yarner Wood	1450.8	1489.5	97.4	1923.5	2014.9	95.5
GB0014R	High Muffles	3039.5	3050.0	99.7	3866.2	3877.4	99.7
GB0015R	Strath Vaich Dam	2519.5	2896.3	87.0	3496.8	4768.6	73.3
GB0031R	Aston Hill	3194.0	3613.5	88.4	5059.0	5559.0	91.0
GB0033R	Bush	1430.6	1436.8	99.6	1667.4	2054.0	81.2
GB0035R	Great Dun Fell	1981.0	2028.5	97.7	2587.7	2625.7	98.6
GB0037R	Ladybower Res.	1879.0	1890.5	99.4	2127.0	2138.3	99.5
GB0038R	Lullington Heath	1394.9	1490.0	93.6	2581.8	2749.1	93.9
GB0039R	Sibton	1663.7	1685.6	98.7	3071.7	3139.8	97.8
GB0043R	Narberth	1786.4	1832.8	97.5	2469.7	2509.1	98.4
GB0045R	Wicken Fen	2229.6	2295.4	97.1	3346.9	3436.3	97.4
GB0048R	Auchencorth Moss	810.9	888.9	91.2	1145.7	1250.8	91.6
GB0049R	Weybourne	2289.7	2361.3	97.0	3940.3	4053.7	97.2
GB0050R	St. Osyth	1283.7	1584.3	81.0	2400.3	2710.3	88.6
GB0052R	Lerwick	1553.3	1589.9	97.7	2499.9	2540.4	98.4
GB0053R	Charlton Mackrell	1422.1	1423.4	99.9	2686.4	2742.1	98.0
GB1055R	Chilbolton Observatory	2097.6	2119.9	98.9	3463.9	3523.5	98.3
GR0001R	Aliartos	13670.5	13847.2	98.7	26924.0	27152.3	99.2
GR0002R	Finokalia	4930.5	10784.8	45.7	6561.9	18322.1	35.8
HU0002R	K-puszta	5159.3	5206.6	99.1	6851.7	8310.6	82.4
HU0003R	Farkasfa	2287.8	4165.7	54.9	5058.1	6789.3	74.5
IE0001R	Valentia Observatory	1366.2	1500.0	91.1	2418.1	2585.7	93.5
IE0031R	Mace Head	2186.9	2186.9	100.0	3607.8	3613.0	99.9
IT0004R	Ispra	11500.3	12257.3	93.8	19082.2	19863.8	96.1
IT0009R	Mt Cimone	14885.5	16620.6	89.6	25327.3	28444.1	89.0
IT0018R	Lampedusa	8950.0	9962.5	89.8	15434.3	18203.9	84.8
LT0015R	Preila	2713.2	2749.4	98.7	3700.4	3768.2	98.2
LV0010R	Rucava	2181.6	2206.7	98.9	2677.8	3051.1	87.8
LV0016R	Zoseni	916.4	916.4	100.0	1313.3	1322.2	99.3
MK0007R	Lazaropole	11854.0	11963.0	99.1	22440.5	22731.5	98.7
MT0001R	Giordan lighthouse	10713.9	10820.9	99.0	19608.1	20195.1	97.1
NL0007R	Eibergen	3935.5	3946.2	99.7	6001.2	6082.2	98.7
NL0009R	Kollumerwaard	1742.1	1753.1	99.4	2897.9	2922.2	99.2
NL0010R	Vredepeel	4255.6	4286.7	99.3	6849.4	6990.9	98.0
NL0091R	De Zilk	3000.0	3086.9	97.2	4785.3	4870.5	98.3
NL0644R	Cabauw Wielsekade	2866.0	3032.4	94.5	4605.0	4758.2	96.8
NO0002R	Birkenes II	2271.9	2293.5	99.1	3043.5	3079.0	98.8
NO0015R	Tustervatn	1666.6	1881.5	88.6	2651.9	3051.9	86.9
NO0039R	Kårvatn	1666.7	1680.5	99.2	2478.3	2503.3	99.0
NO0042G	Zeppelin mountain (Ny-Ålesund)	664.8	668.8	99.4	1054.5	1074.0	98.2
NO0043R	Prestebakke	2434.9	2453.9	99.2	3087.9	3113.4	99.2
NO0052R	Sandve	1922.3	1933.9	99.4	2453.2	2563.3	95.7
NO0056R	Hurdal	1794.5	1808.4	99.2	2098.1	2119.6	99.0

Table 2.1, cont.

Code	Station	May - July			April - September		
		AOT40	AOT40 corrected	Data capture	AOT40	AOT40 corrected	Data capture
PL0002R	Jarczew	3381.9	3428.5	98.6	4954.4	4998.8	99.1
PL0003R	Sniezka	7386.1	7392.6	99.9	11212.9	11245.4	99.7
PL0004R	Leba	3501.8	3504.8	99.9	4647.2	4649.4	100.0
PL0005R	Diabla Gora	4543.6	4560.1	99.6	6142.7	6182.4	99.4
RS0005R	Kamenicki vis	8664.0	8947.6	96.8	16114.5	16878.7	95.5
SE0005R	Bredkälen	1559.6	1563.5	99.7	1960.5	1963.3	99.9
SE0012R	Aspvreten	2000.2	2469.7	81.0	2455.9	2882.3	85.2
SE0013R	Esrange	2061.3	2066.3	99.8	3107.5	3112.0	99.9
SE0014R	Råö	3345.5	3368.7	99.3	4504.1	4523.7	99.6
SE0018R	Asa	3375.7	3443.6	98.0	4822.7	4910.2	98.2
SE0019R	Östad	2771.5	2776.3	99.8	3876.7	3884.2	99.8
SE0020R	Hallahus	4658.4	4715.3	98.8	6236.3	6318.4	98.7
SE0032R	Norra-Kvill	4030.2	4044.0	99.7	5758.6	5778.1	99.7
SE0035R	Vindeln	1638.6	1644.0	99.7	2201.2	2207.5	99.7
SE0039R	Grimsö	2918.0	2940.5	99.2	3679.8	3701.2	99.4
SI0008R	Iskrba	6890.1	7195.6	95.8	12060.3	12660.2	95.3
SI0031R	Zarodnje	7832.3	7939.2	98.7	12698.1	12918.4	98.3
SI0032R	Krvavec	12168.9	13227.5	92.0	19094.1	20666.0	92.4
SI0033R	Kovk	7828.1	8346.0	93.8	13288.8	14254.9	93.2
SK0002R	Chopok	11342.5	11616.6	97.6	18259.5	18589.8	98.2
SK0004R	Stará Lesná	5388.5	5709.1	94.4	8326.0	8588.6	96.9
SK0006R	Starina	4180.0	4378.3	95.5	6812.5	7601.9	89.6
SK0007R	Topolniky	5126.5	5158.8	99.4	8225.5	8310.7	99.0

Annex 3

Seasonal variation

Table 3.1: Monthly mean concentrations 2016 ($\mu g/m^3$).

Code	Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
AT0002R	Illmitz	monthly mean	34.1	48.6	57.2	71.5	81.0	76.7	78.8	69.0	65.0	36.6	35.1	34.3
AT0002R	Illmitz	data capture	95.2	86.1	90.2	94.4	95.3	95.0	95.2	95.0	93.8	95.2	94.6	95.0
AT0005R	Vorhegg	monthly mean	49.8	52.9	70.2	72.1	75.0	68.7	72.0	62.2	63.6	44.9	45.6	65.1
AT0005R	Vorhegg	data capture	95.6	95.4	95.6	95.0	95.6	86.0	95.6	89.0	94.6	95.3	94.7	95.6
AT0030R	Pillersdorf bei Retz	monthly mean	39.8	50.4	55.9	68.5	76.5	71.4	72.9	67.3	75.6	37.5	31.7	35.5
AT0030R	Pillersdorf bei Retz	data capture	94.9	94.8	93.5	94.6	92.7	94.3	93.8	92.7	94.6	95.6	95.7	94.8
AT0032R	Sulzberg	monthly mean	70.5	67.9	76.2	82.9	95.5	86.7	95.4	89.7	89.4	56.8	59.0	66.1
AT0032R	Sulzberg	data capture	95.6	95.8	95.8	94.7	95.8	95.8	95.6	95.8	95.8	94.9	95.0	95.8
AT0034G	Sonnblick	monthly mean	87.3	90.7	99.8	106.4	117.4	107.0	104.6	93.7	97.2	83.5	84.1	94.1
AT0034G	Sonnblick	data capture	96.1	96.1	96.1	52.9	84.8	95.1	95.7	96.2	96.0	96.8	97.5	95.7
AT0038R	Gerlitzen	monthly mean	78.1	81.2	91.1	100.5	110.4	100.5	104.3	90.7	95.1	73.9	73.8	86.2
AT0038R	Gerlitzen	data capture	95.7	95.8	95.6	95.6	95.7	95.7	95.8	95.7	95.7	95.8	95.7	95.7
AT0040R	Masenberg	monthly mean	61.1	64.3	74.3	87.7	95.7	87.6	90.5	83.6	91.3	53.1	54.0	72.1
AT0040R	Masenberg	data capture	95.3	95.7	95.7	95.0	95.3	95.1	95.4	95.4	95.8	95.7	95.6	95.7
AT0041R	Haunsberg	monthly mean	49.1	44.4	60.3	75.3	82.9	84.5	89.9	82.2	78.8	41.8	44.5	44.1
AT0041R	Haunsberg	data capture	90.3	94.8	95.8	96.0	95.4	95.7	95.6	95.3	93.5	94.8	96.0	93.7
AT0042R	Heidenreichstein	monthly mean	43.5	53.4	55.2	66.1	81.7	65.3	68.3	62.9	66.1	33.9	33.2	36.3
AT0042R	Heidenreichstein	data capture	95.6	95.7	95.7	95.6	95.4	95.7	95.4	95.3	95.4	95.3	95.7	95.7
AT0043R	Forsthof	monthly mean	45.5	54.3	56.1	73.4	87.6	86.8	85.9	79.9	84.4	39.7	38.3	44.8
AT0043R	Forsthof	data capture	95.4	95.4	95.3	93.8	93.7	92.4	89.1	95.3	95.4	95.6	95.4	95.2
AT0045R	Dunkelsteinerwald	monthly mean	37.8	50.2	55.2	64.7	70.6	64.5	66.5	60.6	63.9	31.1	25.1	30.8
AT0045R	Dunkelsteinerwald	data capture	94.9	95.3	94.5	95.1	95.0	95.7	95.2	95.6	95.6	95.4	95.4	95.2
AT0046R	Gänserndorf	monthly mean	32.5	48.4	47.3	64.4	75.7	68.1	72.2	65.7	63.9	31.6	29.5	27.8
AT0046R	Gänserndorf	data capture	92.6	95.4	95.6	95.6	95.4	95.3	95.6	95.4	95.7	95.3	95.7	94.6
AT0047R	Stixneusiedl	monthly mean	35.5	51.8	52.1	67.3	76.6	71.7	74.0	65.8	69.6	31.6	32.2	31.0
AT0047R	Stixneusiedl	data capture	95.7	95.7	95.7	95.4	95.7	95.4	95.6	95.7	95.7	95.6	95.6	95.4
AT0048R	Zoebelboden	monthly mean	63.6	68.5	70.5	80.4	87.0	80.5	86.6	77.1	78.5	46.1	51.8	63.2
AT0048R	Zoebelboden	data capture	95.7	94.7	95.0	95.7	95.2	95.3	94.6	95.0	95.3	95.2	94.6	95.6
AT0049R	Grebenzen bei St. Lamprecht	monthly mean	76.0	78.7	89.0	95.7	103.0	92.8	94.5	84.9	89.3	68.4	69.1	83.6
AT0049R	Grebenzen bei St. Lamprecht	data capture	95.6	95.7	91.8	95.7	95.7	95.4	95.4	95.7	95.8	95.7	94.7	95.7
AT0050R	Graz Lustbuehel	monthly mean	25.7	41.6	58.1	73.2	80.8	65.4	72.3	68.1	65.5	30.3	26.4	22.4
AT0050R	Graz Lustbuehel	data capture	95.4	96.0	95.0	95.7	95.2	95.0	95.7	95.7	95.4	95.8	95.0	92.7
AT0002R	Illmitz	monthly mean	34.1	48.6	57.2	71.5	81.0	76.7	78.8	69.0	65.0	36.6	35.1	34.3
AT0002R	Illmitz	data capture	95.2	86.1	90.2	94.4	95.3	95.0	95.2	95.0	93.8	95.2	94.6	95.0
AT0005R	Vorhegg	monthly mean	49.8	52.9	70.2	72.1	75.0	68.7	72.0	62.2	63.6	44.9	45.6	65.1
AT0005R	Vorhegg	data capture	95.6	95.4	95.6	95.0	95.6	86.0	95.6	89.0	94.6	95.3	94.7	95.6
AT0030R	Pillersdorf bei Retz	monthly mean	39.8	50.4	55.9	68.5	76.5	71.4	72.9	67.3	75.6	37.5	31.7	35.5

Table 3.1, cont.

Code	Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
BE0001R	Offagne	monthly mean	49.6	55.6	58.9	62.2	70.6	54.3	55.1	57.9	55.0	33.8	37.6	30.5
BE0001R	Offagne	data capture	97.7	97.7	84.1	97.8	97.0	93.6	97.2	97.6	97.5	94.5	97.5	94.6
BE0032R	Eupen	monthly mean	46.8	43.4	47.3	59.0	68.5	50.3	54.4	55.3	56.8	26.6	32.1	32.5
BE0032R	Eupen	data capture	96.9	82.8	97.3	97.4	97.7	97.1	97.2	97.7	97.8	97.2	92.9	97.7
BE0035R	Vezin	monthly mean	42.7	47.3	46.2	55.7	62.6	46.7	48.3	47.5	44.3	20.7	26.3	22.8
BE0035R	Vezin	data capture	95.4	82.9	97.6	97.8	97.3	96.8	97.3	97.7	97.5	96.8	97.6	97.7
BG0053R	Rojen peak	monthly mean	71.7	77.7	83.4	89.8	-	90.3	103.5	106.4	99.1	75.0	75.5	80.5
BG0053R	Rojen peak	data capture	95.0	94.7	95.3	80.1	0.0	80.1	95.2	95.6	94.9	95.4	95.1	95.6
CH0001G	Jungfraujoch	monthly mean	64.7	67.2	75.5	78.3	86.5	79.2	81.5	75.0	75.6	70.8	63.9	69.8
CH0001G	Jungfraujoch	data capture	95.0	97.4	97.3	97.6	94.6	97.2	95.0	97.6	97.8	96.5	96.8	97.6
CH0002R	Payerne	monthly mean	39.6	47.8	56.8	61.9	71.1	59.7	68.7	65.6	57.3	27.1	29.4	12.3
CH0002R	Payerne	data capture	99.2	99.1	99.2	99.6	99.3	99.3	99.2	99.1	99.3	99.2	99.2	99.5
CH0003R	Tänikon	monthly mean	41.6	50.1	51.1	59.6	69.4	63.9	71.4	64.2	56.9	27.9	31.0	13.2
CH0003R	Tänikon	data capture	99.3	99.1	99.3	99.3	99.5	99.6	99.6	99.2	99.0	99.3	99.2	99.5
CH0004R	Chaumont	monthly mean	70.3	71.6	84.3	87.1	94.6	77.6	90.6	94.8	94.9	61.5	60.4	77.3
CH0004R	Chaumont	data capture	99.6	99.4	87.1	92.8	96.1	99.2	99.3	99.5	99.4	99.5	98.8	99.6
CH0005R	Rigi	monthly mean	70.4	66.8	77.0	83.0	95.0	82.1	92.7	89.2	87.7	55.1	60.2	70.4
CH0005R	Rigi	data capture	99.5	99.4	99.2	99.2	99.5	99.4	99.3	99.2	99.7	99.1	99.0	99.5
CY0002R	Ayia Marina	monthly mean	78.2	88.7	100.0	112.1	107.7	105.6	108.9	99.4	95.4	95.4	88.5	79.1
CY0002R	Ayia Marina	data capture	96.1	97.8	98.1	99.9	99.3	99.6	96.0	95.4	99.2	99.3	92.6	47.7
CZ0001R	Svratouch	monthly mean	50.4	58.1	63.3	78.6	93.6	84.4	82.6	79.3	94.1	44.2	40.3	48.4
CZ0001R	Svratouch	data capture	95.7	91.5	95.3	94.6	92.9	91.2	95.7	95.8	95.7	76.6	95.6	91.7
CZ0003R	Kosetice	monthly mean	49.1	56.8	58.5	75.6	90.2	74.8	79.5	77.0	82.0	42.7	40.0	41.3
CZ0003R	Kosetice	monthly mean	53.0	59.9	64.4	87.4	94.6	85.5	87.5	81.6	90.4	46.3	41.8	46.2
CZ0003R	Kosetice	data capture	100.0	100.0	100.0	29.4	95.8	100.0	100.0	99.9	100.0	77.0	100.0	100.0
CZ0003R	Kosetice	data capture	95.3	95.5	93.8	93.5	93.8	95.8	95.6	95.7	95.8	94.9	95.4	95.7
CZ0005R	Churanov	monthly mean	61.7	63.6	67.5	75.1	89.0	80.1	81.3	78.6	87.0	48.0	56.6	66.7
CZ0005R	Churanov	data capture	97.7	98.0	97.7	97.9	93.1	97.9	97.8	98.0	97.9	97.8	97.5	98.0
DE0001R	Westerland	monthly mean	48.1	63.3	69.6	77.1	82.6	81.0	72.4	68.0	71.8	63.1	53.8	55.4
DE0001R	Westerland	data capture	95.8	92.8	80.1	95.4	95.8	95.4	96.0	94.6	82.8	18.1	96.1	95.8
DE0002R	Waldhof	monthly mean	33.5	51.3	57.3	66.0	79.6	63.4	58.4	54.2	62.7	28.7	27.5	29.6
DE0002R	Waldhof	data capture	95.0	96.0	95.7	76.1	92.9	95.7	96.0	96.1	96.0	93.8	96.0	95.8
DE0003R	Schauinsland	monthly mean	75.7	73.1	81.7	83.2	95.4	85.8	92.8	96.0	103.0	66.2	67.5	76.1
DE0003R	Schauinsland	data capture	95.7	82.8	95.8	95.8	96.1	94.0	93.5	95.7	93.8	86.8	75.1	94.4
DE0007R	Neuglobsow	monthly mean	31.9	51.7	50.7	62.6	76.8	59.3	57.2	49.2	63.8	27.6	27.0	31.4

Table 3.1, cont.

Code	Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
DE0007R	Neuglobsow	data capture	94.6	94.8	95.8	94.0	95.2	87.2	93.7	94.1	94.9	95.4	92.6	95.4
DE0008R	Schmücke	monthly mean	53.6	58.1	64.1	78.6	89.0	79.0	78.0	74.8	89.4	43.4	46.6	54.1
DE0008R	Schmücke	data capture	95.3	94.7	95.4	95.4	94.9	95.1	95.0	95.4	95.4	95.3	93.5	94.0
DE0009R	Zingst	monthly mean	43.3	58.4	60.6	72.2	84.9	77.5	64.4	59.4	64.0	43.0	42.6	43.6
DE0009R	Zingst	data capture	95.3	96.0	96.0	96.1	94.2	95.3	96.1	96.0	94.0	90.2	94.2	95.8
DK0005R	Keldsnor	monthly mean	43.3	57.6	58.5	67.8	75.6	73.0	56.9	56.8	63.6	44.6	45.1	45.6
DK0005R	Keldsnor	data capture	91.1	90.9	91.4	90.8	91.5	90.6	91.4	83.1	90.1	91.5	91.4	90.2
DK0010G	Villum Research Station, Station Nord	monthly mean	78.4	81.8	66.3	44.2	41.2	60.9	49.5	51.3	61.7	70.2	79.9	75.0
DK0010G	Villum Research Station, Station Nord	data capture	91.7	91.4	91.7	87.8	88.6	85.1	91.7	81.6	90.7	77.8	88.9	91.7
DK0012R	Risoe	monthly mean	43.3	57.6	58.5	67.8	75.6	73.0	56.9	56.8	63.6	44.6	45.1	45.6
DK0012R	Risoe	data capture	91.1	90.9	91.4	90.8	91.5	90.6	91.4	83.1	90.1	91.5	91.4	90.2
DK0031R	Ulborg	monthly mean	49.4	61.0	59.1	71.6	80.0	72.2	59.0	57.4	64.3	44.0	53.1	56.3
DK0031R	Ulborg	data capture	88.7	89.9	90.9	83.3	91.4	91.1	91.7	88.6	91.2	87.2	61.5	91.8
EE0009R	Lahemaa	monthly mean	46.9	59.5	67.0	69.7	74.3	62.1	49.1	46.0	41.5	42.6	43.0	55.5
EE0009R	Lahemaa	data capture	100.0	100.0	99.7	100.0	100.0	97.2	100.0	100.0	99.7	100.0	100.0	99.9
ES0001R	San Pablo de los Montes	monthly mean	72.6	78.9	85.5	88.0	83.9	86.6	106.2	101.5	96.1	83.9	68.5	62.4
ES0001R	San Pablo de los Montes	data capture	99.2	98.9	98.8	99.0	89.8	98.6	98.7	99.2	98.9	99.3	99.0	98.7
ES0005R	Noya	monthly mean	71.4	75.0	78.7	84.5	83.5	57.5	67.8	76.3	68.2	69.2	65.6	61.3
ES0005R	Noya	data capture	91.5	98.9	99.6	98.9	98.8	96.7	99.6	98.3	95.4	97.8	95.8	99.1
ES0006R	Mahón	monthly mean	70.1	76.5	91.4	93.1	101.4	89.0	99.1	84.0	100.8	85.9	78.3	77.3
ES0006R	Mahón	data capture	98.0	99.0	99.2	95.4	99.1	99.3	99.2	75.5	98.9	98.1	98.6	98.9
ES0007R	Víznar	monthly mean	67.3	72.8	87.3	90.9	99.7	96.5	100.7	89.9	89.7	82.0	74.5	72.1
ES0007R	Víznar	data capture	97.7	98.6	98.8	99.3	98.3	99.2	99.3	83.7	98.5	98.8	98.9	99.5
ES0008R	Niembro	monthly mean	68.2	72.9	81.6	86.9	85.3	72.3	70.8	69.5	65.0	66.0	63.4	57.8
ES0008R	Niembro	data capture	97.7	95.7	83.1	99.2	98.9	99.3	99.1	98.7	98.9	98.8	97.6	98.9
ES0009R	Campisabalos	monthly mean	56.7	63.7	74.1	79.2	83.4	68.0	76.2	71.0	66.3	58.0	56.2	51.5
ES0009R	Campisabalos	data capture	94.2	98.0	99.1	98.9	96.9	98.5	98.8	98.7	99.0	99.1	99.2	96.8
ES0010R	Cabo de Creus	monthly mean	54.2	64.9	77.7	80.9	82.9	81.1	76.5	74.8	76.6	62.5	53.1	45.2
ES0010R	Cabo de Creus	data capture	99.1	97.0	99.1	96.7	97.4	99.3	99.2	99.2	99.2	99.1	99.2	99.1
ES0011R	Barcarrota	monthly mean	32.0	36.7	34.6	35.4	58.3	56.7	67.9	64.7	56.0	48.3	38.8	36.7
ES0011R	Barcarrota	data capture	99.3	98.7	96.6	99.3	97.7	99.0	97.7	98.3	99.0	99.5	99.3	99.1
ES0012R	Zarra	monthly mean	74.2	76.5	88.2	96.3	104.1	107.2	109.8	102.0	99.3	87.3	75.0	69.0
ES0012R	Zarra	data capture	98.0	99.1	98.3	98.6	98.7	98.6	99.2	99.1	98.3	99.2	99.2	99.1
ES0013R	Penausende	monthly mean	63.0	65.4	71.1	73.4	76.6	72.8	82.4	79.1	71.1	63.1	53.7	43.6
ES0013R	Penausende	data capture	98.7	99.4	98.7	97.9	99.1	98.9	99.2	98.9	98.3	99.1	98.9	98.7

Table 3.1, cont.

Code	Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
ES0014R	Els Torms	monthly mean	57.1	69.6	78.4	84.3	89.1	91.3	94.2	86.9	85.5	67.0	54.3	33.6
ES0014R	Els Torms	data capture	98.3	97.8	98.9	98.8	98.3	99.3	97.4	99.3	98.2	99.1	99.0	99.1
ES0016R	O Saviñao	monthly mean	56.3	62.3	67.7	68.6	66.2	53.8	57.0	66.1	55.2	46.9	41.3	36.5
ES0016R	O Saviñao	data capture	98.9	99.3	99.3	98.6	96.8	98.2	98.8	99.3	99.2	99.2	99.3	98.8
ES0017R	Doñana	monthly mean	46.9	56.8	63.9	67.9	72.8	68.7	77.4	78.2	70.8	58.4	51.0	43.4
ES0017R	Doñana	data capture	99.2	97.7	82.8	98.5	98.7	99.2	98.9	98.7	98.8	95.7	97.5	98.8
FI0009R	Utö	monthly mean	58.1	63.9	71.4	75.7	81.3	78.7	69.8	62.8	62.0	57.2	56.7	62.8
FI0009R	Utö	data capture	100.0	99.4	100.0	100.0	97.7	100.0	100.0	100.0	100.0	99.9	97.2	99.9
FI0018R	Virolahti III	monthly mean	37.8	58.2	62.3	65.2	68.7	62.0	50.5	46.2	41.2	40.5	42.6	54.9
FI0018R	Virolahti III	data capture	99.9	98.4	100.0	99.9	99.6	99.9	100.0	99.3	98.9	99.2	99.7	99.9
FI0022R	Oulanka	monthly mean	53.3	61.0	72.3	81.0	75.2	59.5	51.3	44.5	42.6	45.3	54.0	70.8
FI0022R	Oulanka	data capture	99.5	98.9	97.0	100.0	99.3	100.0	98.9	99.7	100.0	99.1	100.0	98.9
FI0037R	Ähtäri II	monthly mean	42.2	57.3	66.2	68.7	71.1	57.1	45.2	41.9	39.1	43.1	48.1	57.8
FI0037R	Ähtäri II	data capture	100.0	99.0	100.0	100.0	99.5	99.7	100.0	99.5	99.0	99.9	100.0	99.9
FI0096G	Pallas (Sammaltunturi)	monthly mean	65.1	69.1	77.0	83.7	84.1	66.5	61.3	53.2	50.2	56.1	63.9	76.9
FI0096G	Pallas (Sammaltunturi)	data capture	99.6	99.7	90.3	98.9	100.0	97.4	93.1	99.3	98.9	98.7	100.0	99.9
FR0008R	Donon	monthly mean	50.7	50.4	49.9	57.4	65.0	49.0	56.8	67.6	66.1	35.7	38.8	48.2
FR0008R	Donon	data capture	99.7	100.0	99.6	99.7	100.0	99.6	99.7	100.0	99.9	93.1	100.0	99.5
FR0009R	Revin	monthly mean	50.8	57.6	63.4	71.1	75.3	56.9	58.5	64.0	64.7	37.7	40.3	35.3
FR0009R	Revin	data capture	100.0	99.3	99.6	99.6	99.1	100.0	100.0	99.6	100.0	100.0	99.3	97.6
FR0010R	Morvan	monthly mean	62.6	66.7	66.1	75.4	80.1	56.4	59.8	65.0	69.0	52.2	53.6	55.4
FR0010R	Morvan	data capture	98.0	97.4	92.1	99.7	67.6	96.9	99.7	99.6	99.9	70.6	100.0	100.0
FR0013R	Peyrusse Vieille	monthly mean	49.9	66.8	71.3	75.8	79.9	72.0	67.7	76.6	71.3	57.5	50.9	48.8
FR0013R	Peyrusse Vieille	data capture	17.6	99.7	100.0	99.4	100.0	99.9	99.6	100.0	100.0	99.6	100.0	99.3
FR0014R	Montandon	monthly mean	55.2	56.9	58.4	60.3	65.6	53.0	62.9	69.7	66.7	37.2	38.9	38.4
FR0014R	Montandon	data capture	99.3	100.0	96.9	99.7	99.6	97.6	99.7	90.5	99.3	98.7	98.9	99.7
FR0015R	La Tardière	monthly mean	52.0	63.7	65.1	68.6	71.6	57.3	59.8	68.6	51.9	43.6	42.0	32.4
FR0015R	La Tardière	data capture	100.0	99.9	91.5	97.9	99.5	99.6	100.0	93.0	99.9	96.1	98.5	98.0
FR0016R	Le Casset	monthly mean	84.2	86.7	100.1	96.0	104.3	88.8	95.1	95.6	92.8	83.6	79.0	87.8
FR0016R	Le Casset	data capture	100.0	100.0	99.9	99.9	100.0	100.0	82.8	92.5	100.0	100.0	99.6	99.9
FR0017R	Montfranc	monthly mean	69.0	70.4	75.2	85.2	89.8	68.2	77.0	83.4	84.4	64.3	64.7	72.5
FR0017R	Montfranc	data capture	100.0	97.8	99.6	99.7	99.7	99.7	100.0	97.3	99.9	83.5	99.7	99.7
FR0018R	La Coulonche	monthly mean	61.1	69.2	69.1	79.2	81.8	64.2	60.1	70.2	62.7	50.7	51.0	50.5
FR0018R	La Coulonche	data capture	99.9	99.9	99.9	99.2	92.6	100.0	99.7	99.1	100.0	100.0	99.4	99.5
FR0019R	Pic du Midi	monthly mean	81.8	90.2	95.1	101.1	107.7	94.2	101.2	93.1	93.2	93.4	84.8	89.7
FR0019R	Pic du Midi	data capture	99.6	99.9	100.0	86.1	99.6	87.8	99.9	99.6	99.7	99.9	99.7	99.2

Table 3.1, cont.

Code	Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
FR0023R	Saint-Nazaire-le-Désert	monthly mean	43.3	54.8	64.4	76.6	81.0	67.6	71.0	71.5	71.4	43.3	41.7	30.8
FR0023R	Saint-Nazaire-le-Désert	data capture	98.5	98.6	93.3	96.7	98.0	98.6	96.1	95.3	98.3	90.9	96.8	98.5
FR0025R	Verneuil	monthly mean	50.0	61.2	61.6	63.8	65.6	50.5	56.7	60.8	56.2	38.1	42.9	26.5
FR0025R	Verneuil	data capture	99.5	95.4	98.3	99.7	95.7	99.9	99.3	100.0	99.3	99.2	99.9	99.9
FR0030R	Puy de Dôme	monthly mean	80.2	77.1	85.1	91.0	97.7	77.5	86.9	91.2	92.6	81.0	75.0	86.7
FR0030R	Puy de Dôme	data capture	98.0	98.3	97.2	92.6	92.5	96.0	93.4	98.7	94.9	91.1	83.8	98.7
GB0002R	Eskdalemuir	monthly mean	50.4	59.3	59.0	66.2	77.1	58.7	44.7	46.1	44.2	47.6	47.8	52.3
GB0002R	Eskdalemuir	data capture	99.6	100.0	96.6	99.7	85.2	99.9	99.6	100.0	100.0	99.7	96.4	100.0
GB0006R	Lough Navar	monthly mean	54.2	57.9	57.4	63.6	62.9	46.2	35.0	37.8	35.1	34.2	36.8	44.1
GB0006R	Lough Navar	data capture	100.0	99.7	99.5	95.7	84.5	99.9	100.0	99.7	97.2	99.9	99.4	77.2
GB0013R	Yarner Wood	monthly mean	65.0	67.0	65.0	69.7	70.1	53.5	44.0	47.9	39.8	37.4	48.0	43.4
GB0013R	Yarner Wood	data capture	99.9	99.3	99.5	99.9	95.0	99.7	98.9	96.8	80.3	99.7	100.0	57.7
GB0014R	High Muffles	monthly mean	64.1	67.0	66.8	73.9	82.4	64.1	49.1	50.9	47.4	48.9	52.6	41.1
GB0014R	High Muffles	data capture	8.2	95.3	100.0	99.7	100.0	99.7	99.7	100.0	100.0	96.5	100.0	97.0
GB0015R	Strath Vaich Dam	monthly mean	66.2	74.5	72.1	80.9	84.2	64.7	50.8	-	53.6	56.7	64.0	70.0
GB0015R	Strath Vaich Dam	data capture	99.1	99.9	99.6	99.6	99.6	100.0	60.2	0.0	78.8	99.9	99.7	99.9
GB0031R	Aston Hill	monthly mean	64.2	71.0	77.9	83.3	87.1	60.8	48.9	54.6	48.8	47.3	56.4	56.7
GB0031R	Aston Hill	data capture	100.0	99.7	99.9	100.0	82.7	85.1	99.5	99.5	81.0	97.3	91.7	84.9
GB0033R	Bush	monthly mean	51.5	57.7	60.9	69.3	77.1	56.0	47.6	44.8	54.5	45.5	52.9	56.3
GB0033R	Bush	data capture	100.0	95.5	100.0	99.2	100.0	99.3	100.0	46.6	26.5	99.7	100.0	100.0
GB0035R	Great Dun Fell	monthly mean	41.3	50.5	52.1	64.5	78.1	57.3	44.7	49.2	48.2	54.0	-	-
GB0035R	Great Dun Fell	data capture	99.9	100.0	100.0	99.7	100.0	94.3	99.6	99.9	99.9	55.9	0.0	0.0
GB0037R	Ladybower Res.	monthly mean	52.1	57.8	54.4	62.6	71.5	56.7	48.3	50.4	48.3	46.1	49.4	48.6
GB0037R	Ladybower Res.	data capture	99.7	100.0	86.6	99.4	99.6	100.0	99.5	100.0	99.7	53.9	99.6	100.0
GB0038R	Lullington Heath	monthly mean	58.2	62.2	61.6	67.3	69.1	52.0	46.8	57.2	53.1	41.0	48.4	43.5
GB0038R	Lullington Heath	data capture	99.6	93.4	99.7	99.6	100.0	95.8	87.6	91.5	94.6	99.7	99.9	100.0
GB0039R	Sibton	monthly mean	50.1	59.8	60.9	64.0	69.7	52.3	48.0	54.7	50.5	39.7	41.4	29.0
GB0039R	Sibton	data capture	100.0	99.6	99.6	99.7	95.6	100.0	100.0	95.0	96.1	99.9	100.0	99.5
GB0043R	Narberth	monthly mean	65.8	71.9	69.8	74.4	74.8	58.0	42.0	48.9	49.3	49.5	57.0	54.7
GB0043R	Narberth	data capture	99.6	96.7	99.9	99.7	100.0	99.4	94.2	99.9	99.6	99.7	99.9	100.0
GB0045R	Wicken Fen	monthly mean	46.3	52.8	53.1	58.6	68.2	50.9	48.6	51.0	42.2	31.6	33.6	25.4
GB0045R	Wicken Fen	data capture	100.0	98.0	97.6	98.8	99.6	99.9	92.9	99.5	96.8	93.1	99.9	99.1
GB0048R	Auchencorth Moss	monthly mean	54.5	63.6	61.5	68.2	74.0	56.6	46.0	46.9	47.3	48.4	51.9	55.5
GB0048R	Auchencorth Moss	data capture	99.1	99.3	99.5	99.6	73.0	99.9	100.0	80.1	99.9	99.3	99.9	100.0
GB0049R	Weybourne	monthly mean	52.5	64.5	68.0	74.8	78.1	63.5	55.9	64.1	57.2	55.7	53.4	38.6
GB0049R	Weybourne	data capture	100.0	99.7	100.0	99.7	100.0	100.0	89.9	94.5	99.9	99.7	100.0	100.0
GB0050R	St. Osyth	monthly mean	47.0	54.8	57.4	62.7	65.3	53.7	46.2	50.9	49.7	37.5	40.1	25.9
GB0050R	St. Osyth	data capture	99.6	99.4	99.1	99.7	98.7	50.7	96.8	97.6	99.7	96.4	100.0	99.1

Table 3.1, cont.

Code	Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
GB0052R	Lerwick	monthly mean	67.4	73.3	72.9	80.9	80.5	70.3	55.7	57.9	61.9	62.9	70.5	74.8
GB0052R	Lerwick	data capture	99.5	85.5	98.9	99.6	92.9	100.0	99.7	99.6	100.0	99.3	99.7	99.9
GB0053R	Charlton Mackrell	monthly mean	66.8	72.5	71.8	77.2	68.6	52.7	47.5	51.7	48.1	43.9	53.6	45.1
GB0053R	Charlton Mackrell	data capture	97.2	99.6	99.5	96.2	100.0	99.7	100.0	93.7	100.0	99.7	100.0	100.0
GB1055R	Chilbolton Observatory	monthly mean	49.7	59.1	59.2	65.9	66.9	48.1	43.6	50.0	42.7	34.7	40.6	27.6
GB1055R	Chilbolton Observatory	data capture	42.3	96.4	99.9	99.7	98.3	99.7	99.6	95.4	100.0	99.7	100.0	99.5
GR0001R	Aliartos	monthly mean	27.7	75.5	70.9	75.2	74.4	79.9	87.1	90.3	72.7	56.4	48.2	44.5
GR0001R	Aliartos	data capture	62.8	15.4	99.3	99.6	99.6	100.0	98.5	100.0	99.6	99.6	99.6	99.5
GR0002R	Finokalia	monthly mean	79.0	82.5	91.1	97.3	102.9	103.3	113.9	111.1	95.1	93.9	-	73.7
GR0002R	Finokalia	data capture	96.4	97.7	78.5	71.8	51.9	92.2	43.5	37.9	39.4	23.0	0.0	28.1
HU0002R	K-puszta	monthly mean	31.3	39.7	48.0	62.1	65.4	56.5	53.8	51.1	-	29.2	34.5	33.0
HU0002R	K-puszta	data capture	96.4	100.0	100.0	100.0	100.0	98.6	100.0	79.0	0.0	92.1	100.0	99.6
HU0003R	Farkasfa	monthly mean	-	51.2	64.2	77.3	71.3	58.6	-	56.0	52.7	28.6	28.4	22.2
HU0003R	Farkasfa	data capture	0.0	73.4	99.9	100.0	96.1	72.4	0.0	95.2	99.6	99.2	100.0	64.5
IE0001R	Valentia Observatory	monthly mean	74.7	76.9	76.6	82.3	80.1	63.3	50.6	57.6	62.0	81.2	61.8	65.0
IE0001R	Valentia Observatory	data capture	100.0	100.0	100.0	90.0	80.5	93.1	100.0	100.0	100.0	99.9	100.0	100.0
IE0031R	Mace Head	monthly mean	75.2	79.4	79.5	84.7	84.8	68.5	56.5	59.5	63.0	59.2	72.1	74.1
IE0031R	Mace Head	data capture	100.0	100.0	100.0	99.7	100.0	100.0	100.0	100.0	99.9	99.9	100.0	100.0
IT0004R	Ispra	monthly mean	14.1	29.0	54.6	62.6	73.0	73.0	82.7	69.7	56.0	20.2	16.3	6.5
IT0004R	Ispra	data capture	100.0	54.5	93.7	100.0	100.0	87.8	91.4	97.7	97.4	100.0	95.8	67.6
IT0009R	Mt Cimone	monthly mean	83.4	89.4	100.7	105.0	112.3	111.5	115.1	107.2	106.2	88.0	83.6	89.9
IT0009R	Mt Cimone	data capture	92.2	84.2	37.2	59.2	66.8	96.7	100.0	100.0	98.2	100.0	97.6	100.0
IT0018R	Lampedusa	monthly mean	81.9	89.6	97.3	98.1	99.2	97.1	92.8	92.1	95.5	82.2	82.1	80.9
IT0018R	Lampedusa	data capture	78.5	55.0	96.4	56.9	69.2	100.0	100.0	99.6	83.3	97.7	98.1	94.9
LT0015R	Preila	monthly mean	50.0	57.7	65.5	81.2	83.6	64.2	64.0	55.2	47.1	34.0	35.9	48.9
LT0015R	Preila	data capture	100.0	96.8	98.0	96.8	100.0	96.8	98.8	94.8	100.0	95.7	100.0	98.9
LV0010R	Rucava	monthly mean	62.9	-	-	67.9	67.1	64.5	55.5	54.1	42.5	36.2	37.9	52.8
LV0010R	Rucava	data capture	5.1	0.0	0.0	39.3	92.1	90.4	84.9	72.6	85.1	82.4	81.3	73.1
LV0016R	Zoseni	monthly mean	37.8	-	64.0	72.1	65.1	55.3	47.1	47.5	40.7	41.6	45.4	54.6
LV0016R	Zoseni	data capture	10.7	0.0	1.9	89.5	92.1	90.4	88.6	86.8	84.5	67.2	81.6	79.8
MK0007R	Lazaropole	monthly mean	79.3	87.3	92.4	104.2	97.8	87.7	83.2	86.5	77.1	71.0	77.4	88.2
MK0007R	Lazaropole	data capture	80.0	100.0	100.0	100.0	99.9	100.0	97.0	98.9	98.5	95.0	96.4	78.1
MT0001R	Giordan lighthouse	monthly mean	87.8	89.3	98.4	99.1	101.6	94.1	95.9	93.2	93.5	79.1	81.0	80.9
MT0001R	Giordan lighthouse	data capture	99.9	83.8	69.9	99.7	98.8	99.6	99.7	99.6	88.6	99.1	99.7	51.3

Table 3.1, cont.

Code	Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
NL0007R	Eibergen	monthly mean	27.2	41.1	49.8	58.3	68.3	52.6	45.4	43.6	43.5	20.4	20.7	15.2
NL0007R	Eibergen	data capture	98.9	98.1	98.3	98.9	99.1	98.5	98.9	94.5	97.6	98.0	99.0	96.9
NL0009R	Kollumerwaard	monthly mean	34.9	53.5	56.1	62.0	67.4	58.3	52.7	48.2	48.9	30.4	33.2	26.6
NL0009R	Kollumerwaard	data capture	98.9	98.9	98.4	96.1	98.4	98.9	98.5	99.1	98.3	93.8	99.0	97.6
NL0010R	Vredepeel	monthly mean	33.7	45.2	50.1	59.7	67.7	56.2	53.6	48.8	43.7	21.9	24.2	19.4
NL0010R	Vredepeel	data capture	78.6	97.4	91.9	95.7	98.1	98.9	98.8	93.5	98.9	98.9	98.5	98.9
NL0091R	De Zilk	monthly mean	39.4	51.6	54.6	64.8	72.6	59.2	58.3	55.7	51.0	30.4	30.6	23.0
NL0091R	De Zilk	data capture	98.9	98.1	98.5	98.9	99.1	92.9	97.0	99.1	98.3	98.9	82.4	98.9
NL0644R	Cabauw Wielsekade	monthly mean	30.8	42.7	47.0	56.1	65.9	52.7	52.5	48.8	43.3	23.1	22.8	15.6
NL0644R	Cabauw Wielsekade	data capture	98.9	97.7	98.3	98.9	99.1	97.8	87.0	99.1	98.2	98.9	98.6	98.4
NO0002R	Birkenes II	monthly mean	57.8	66.6	68.0	73.4	76.4	65.1	52.2	49.0	50.2	50.1	57.1	60.0
NO0002R	Birkenes II	data capture	98.4	99.3	99.3	99.4	99.6	99.2	99.7	99.3	99.3	99.6	98.1	99.6
NO0015R	Tustervatn	monthly mean	70.7	76.9	81.7	86.0	86.5	59.7	54.6	49.1	48.8	52.3	63.6	76.7
NO0015R	Tustervatn	data capture	99.3	99.4	99.3	78.1	76.7	95.3	95.2	87.1	97.2	99.2	99.4	99.2
NO0039R	Kårvatn	monthly mean	58.8	70.5	72.6	71.8	69.7	46.9	34.9	29.2	27.8	40.5	52.8	53.5
NO0039R	Kårvatn	data capture	99.6	98.4	99.7	99.6	99.3	98.8	99.5	99.5	99.0	99.7	98.6	98.9
NO0042G	Zeppelin mountain (Ny-Ålesund)	monthly mean	79.0	80.1	77.7	72.2	79.2	63.0	54.6	53.5	64.0	72.4	75.5	77.3
NO0042G	Zeppelin mountain (Ny-Ålesund)	data capture	80.2	99.7	64.2	83.3	99.9	99.0	99.7	99.9	99.2	99.9	99.2	99.6
NO0043R	Prestebakke	monthly mean	52.3	58.3	60.8	70.9	76.2	69.4	55.2	48.6	49.2	48.5	49.0	53.6
NO0043R	Prestebakke	data capture	99.3	99.7	99.9	99.9	99.6	99.3	99.7	99.2	99.7	98.9	99.7	99.7
NO0052R	Sandve	monthly mean	58.8	64.7	64.8	72.7	77.2	62.4	55.3	51.1	59.1	42.1	57.2	67.1
NO0052R	Sandve	data capture	99.6	99.6	97.6	75.0	99.5	99.7	99.9	98.9	99.6	99.3	99.0	98.9
NO0056R	Hurdal	monthly mean	53.1	60.8	63.1	66.9	74.1	64.0	50.8	43.1	43.7	46.0	49.0	45.9
NO0056R	Hurdal	data capture	61.4	99.7	99.6	99.3	99.6	98.9	99.7	99.6	99.4	99.7	99.4	98.9
PL0002R	Jarczew	monthly mean	32.0	42.3	44.1	60.6	67.2	66.4	50.2	46.3	47.7	29.2	28.0	26.2
PL0002R	Jarczew	data capture	100.0	100.0	100.0	99.6	100.0	96.2	100.0	100.0	100.0	99.9	100.0	100.0
PL0003R	Sniezka	monthly mean	64.1	65.6	75.2	86.6	102.8	90.5	85.9	79.2	90.6	53.4	59.9	73.5
PL0003R	Sniezka	data capture	99.7	99.9	100.0	100.0	100.0	99.7	99.9	100.0	99.3	100.0	100.0	100.0
PL0004R	Leba	monthly mean	48.0	57.7	60.2	76.1	80.9	75.4	63.1	57.3	55.6	38.3	42.5	51.3
PL0004R	Leba	data capture	100.0	100.0	100.0	100.0	99.5	100.0	100.0	100.0	100.0	99.9	100.0	100.0
PL0005R	Diabla Gora	monthly mean	38.0	47.3	47.3	67.7	74.5	65.2	56.4	54.4	41.4	34.5	33.0	44.2
PL0005R	Diabla Gora	data capture	92.7	98.4	97.8	96.7	99.9	100.0	99.6	99.9	100.0	98.8	99.3	98.7
RS0005R	Kamenicki vis	monthly mean	-	-	84.6	87.8	92.5	87.3	101.2	92.1	96.6	55.6	60.4	58.6
RS0005R	Kamenicki vis	data capture	0.0	0.0	88.6	84.9	98.5	95.0	100.0	99.3	99.9	99.9	98.5	99.9
SE0005R	Bredkälen	monthly mean	59.3	67.2	71.9	72.5	77.6	60.9	50.9	40.4	37.4	45.0	54.2	65.1
SE0005R	Bredkälen	data capture	99.6	100.0	100.0	100.0	99.6	99.3	99.7	100.0	99.4	100.0	97.8	99.5

Table 3.1, cont.

Code	Station		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
SE0012R	Aspvreten	monthly mean	52.6	50.4	52.8	64.1	70.2	59.5	46.4	42.2	43.7	47.8	41.2	50.2
SE0012R	Aspvreten	data capture	76.6	99.6	92.6	80.1	73.9	83.2	86.4	92.7	100.0	100.0	100.0	99.7
SE0013R	Esrange	monthly mean	66.4	71.6	76.6	84.1	84.8	66.6	59.8	51.1	48.6	51.4	59.7	77.3
SE0013R	Esrange	data capture	99.7	100.0	100.0	100.0	99.6	99.7	99.9	100.0	100.0	99.7	99.9	99.7
SE0014R	Råö	monthly mean	50.9	59.4	57.1	76.3	78.1	76.5	63.8	60.2	63.5	47.9	52.5	55.2
SE0014R	Råö	data capture	100.0	99.6	96.0	100.0	99.9	98.6	99.6	100.0	99.6	100.0	99.9	99.7
SE0018R	Asa	monthly mean	50.3	53.9	55.0	70.1	71.0	68.6	52.6	46.0	46.3	48.1	46.6	50.0
SE0018R	Asa	data capture	99.6	99.9	92.1	97.5	99.7	93.3	99.7	99.6	100.0	100.0	99.7	96.8
SE0019R	Östad	monthly mean	47.4	51.1	51.7	67.8	68.2	65.5	49.2	45.1	41.2	44.9	44.9	47.3
SE0019R	Östad	data capture	99.6	97.7	100.0	100.0	100.0	99.4	99.9	100.0	99.7	100.0	99.9	99.7
SE0020R	Hallahus	monthly mean	51.1	57.1	60.6	76.4	86.3	72.5	55.8	53.8	59.7	44.3	46.0	51.3
SE0020R	Hallahus	data capture	100.0	100.0	92.2	97.5	99.3	99.2	97.6	99.7	99.7	99.9	99.9	99.1
SE0032R	Norra-Kvill	monthly mean	58.0	61.1	65.7	79.2	84.9	76.7	65.2	58.8	64.2	52.8	50.8	58.3
SE0032R	Norra-Kvill	data capture	99.7	100.0	99.9	100.0	100.0	98.9	99.7	99.6	100.0	100.0	95.4	99.5
SE0035R	Vindeln	monthly mean	49.5	58.1	64.8	70.0	71.7	56.3	49.3	37.2	35.5	38.0	49.2	54.0
SE0035R	Vindeln	data capture	98.8	99.9	99.9	100.0	99.5	99.4	99.6	100.0	99.7	100.0	99.7	99.5
SE0039R	Grimsö	monthly mean	48.6	61.2	60.7	68.3	75.1	64.2	53.5	47.6	43.2	50.4	48.2	59.1
SE0039R	Grimsö	data capture	99.5	100.0	99.9	100.0	100.0	97.5	99.9	100.0	99.6	100.0	99.4	73.7
SI0008R	Iskrba	monthly mean	38.3	49.7	59.9	69.1	69.7	53.1	54.3	46.9	44.4	36.1	42.6	29.6
SI0008R	Iskrba	data capture	95.8	95.7	95.8	93.6	95.8	94.6	95.2	95.6	95.6	95.3	95.0	94.0
SI0031R	Zarodnje	monthly mean	52.7	66.1	77.0	89.4	95.7	84.4	90.3	82.7	84.2	49.6	49.4	46.3
SI0031R	Zarodnje	data capture	91.8	94.1	94.2	93.2	94.2	95.7	95.3	94.6	94.3	95.6	92.4	92.6
SI0032R	Krvavec	monthly mean	75.5	80.4	92.2	99.4	108.7	101.8	109.3	95.5	95.8	71.9	72.7	87.9
SI0032R	Krvavec	data capture	91.9	95.4	95.4	90.3	89.8	92.1	91.9	96.0	94.4	95.8	95.7	95.6
SI0033R	Kovk	monthly mean	55.5	65.5	77.7	92.8	97.0	87.2	93.0	85.3	89.1	53.5	56.4	52.7
SI0033R	Kovk	data capture	95.7	95.8	95.8	95.7	96.0	93.5	95.3	95.8	84.6	96.0	95.8	88.7
SK0002R	Chopok	monthly mean	-	81.7	79.2	93.7	111.6	96.4	97.8	94.5	100.0	75.3	76.8	86.6
SK0002R	Chopok	data capture	0.0	12.1	93.8	99.9	99.9	98.8	95.3	99.3	96.8	95.4	95.4	95.4
SK0004R	Stará Lesná	monthly mean	47.7	56.6	64.5	71.5	80.0	69.6	62.8	51.8	57.4	43.1	44.3	48.1
SK0004R	Stará Lesná	data capture	96.6	100.0	96.8	100.0	99.3	99.9	87.6	99.7	100.0	98.3	96.0	94.6
SK0006R	Starina	monthly mean	-	-	62.6	66.6	71.3	61.0	62.6	61.8	59.5	44.9	49.0	45.2
SK0006R	Starina	data capture	0.0	0.0	40.9	79.4	98.0	98.6	94.8	75.7	98.9	98.1	93.9	89.7
SK0007R	Topolniky	monthly mean	26.9	47.4	47.9	62.0	71.5	63.0	61.9	57.0	52.0	32.2	24.2	15.4
SK0007R	Topolniky	data capture	97.2	100.0	100.0	98.9	99.9	100.0	96.9	99.5	97.1	98.4	92.5	40.1

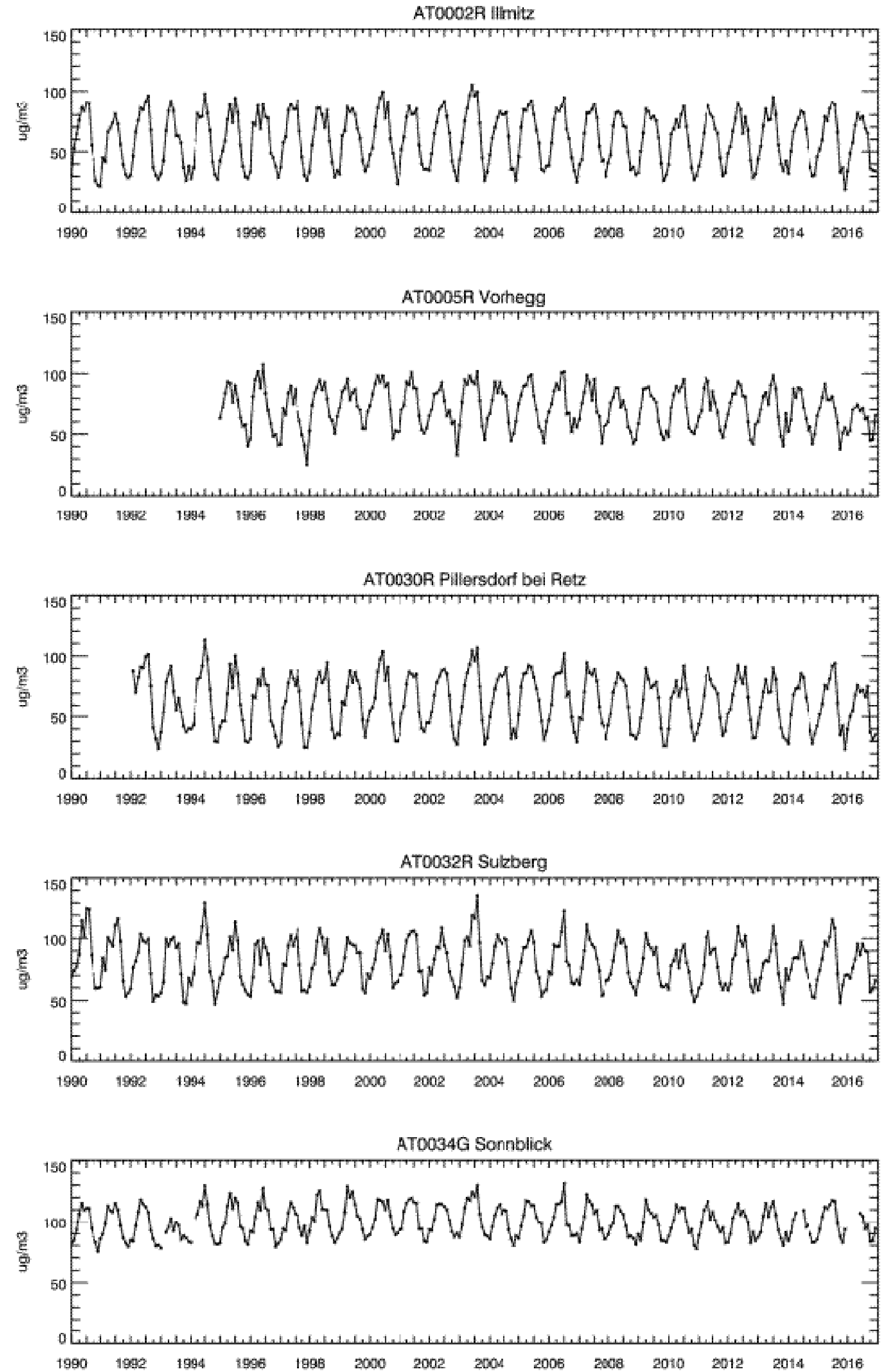


Figure 3.1: Seasonal variation, 1990–2016.

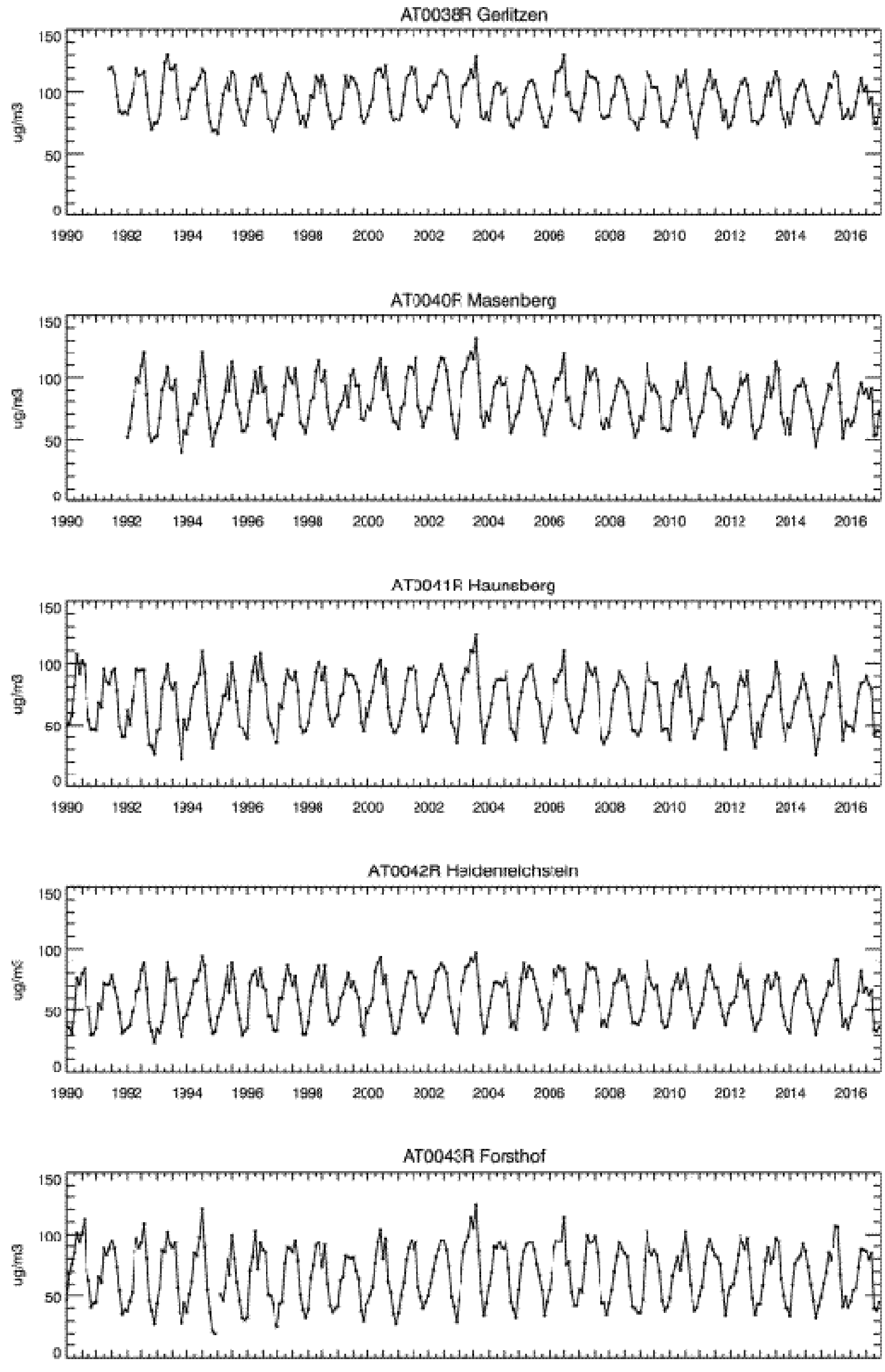
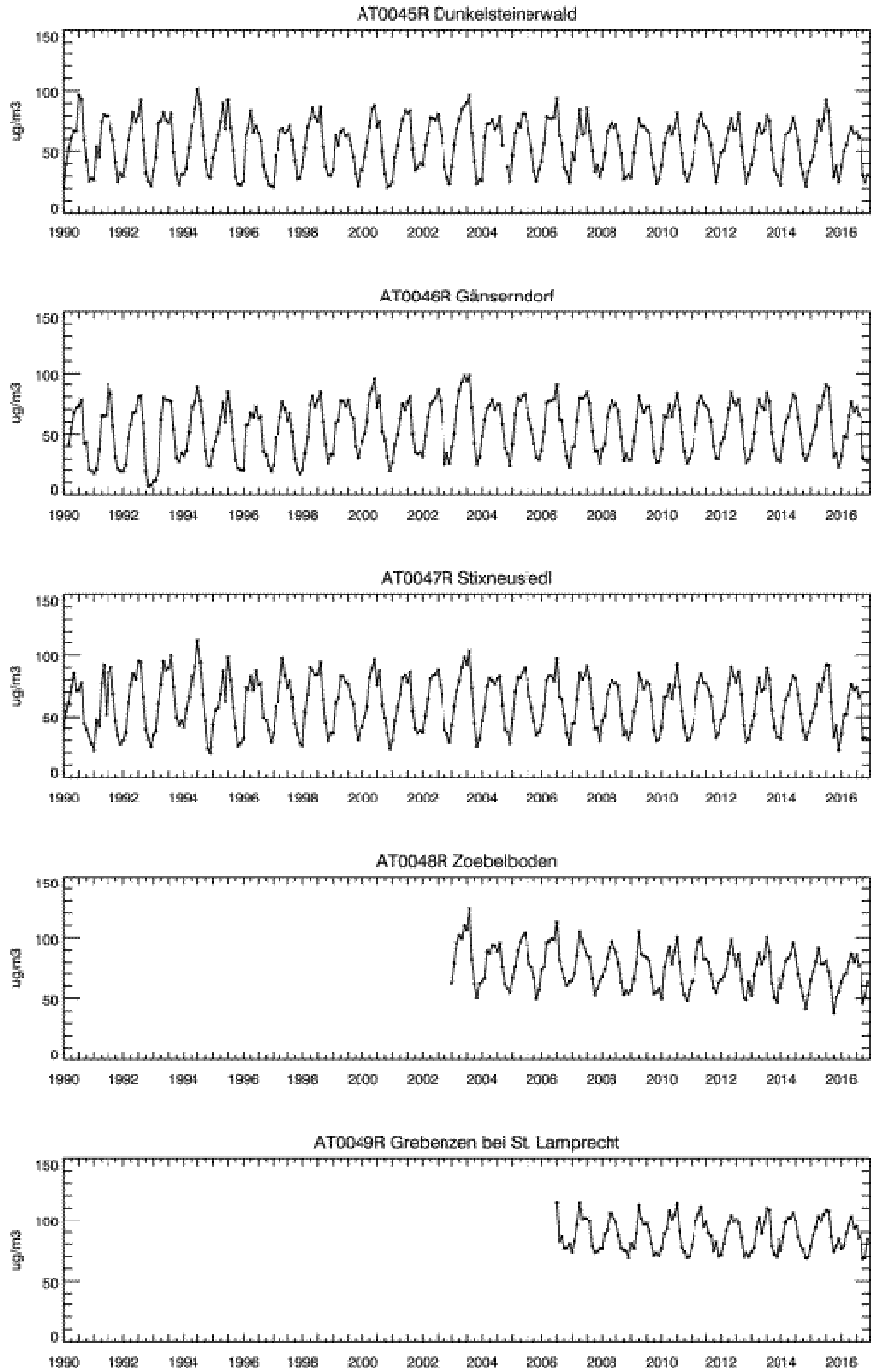


Figure 3.1, cont.



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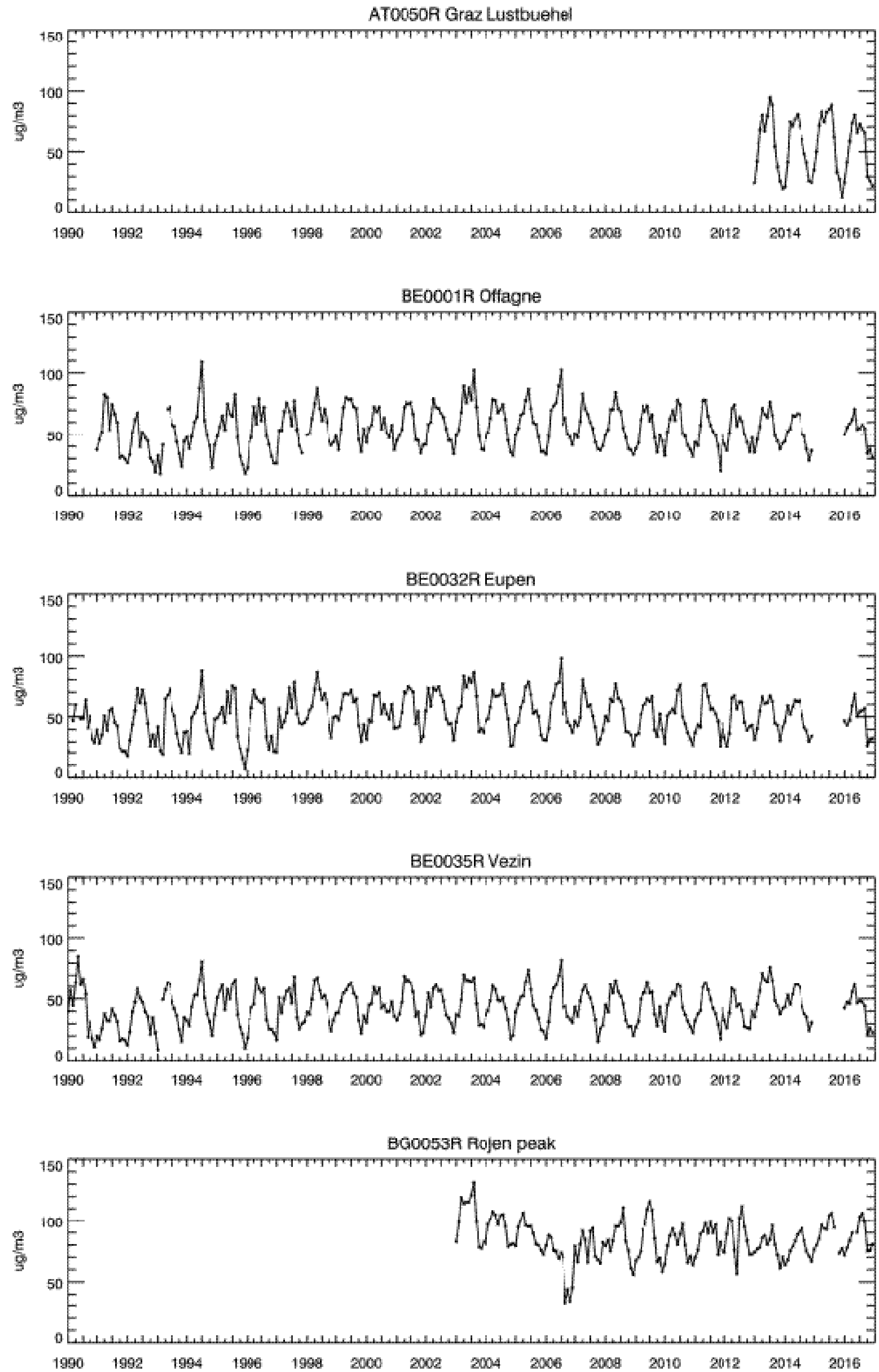

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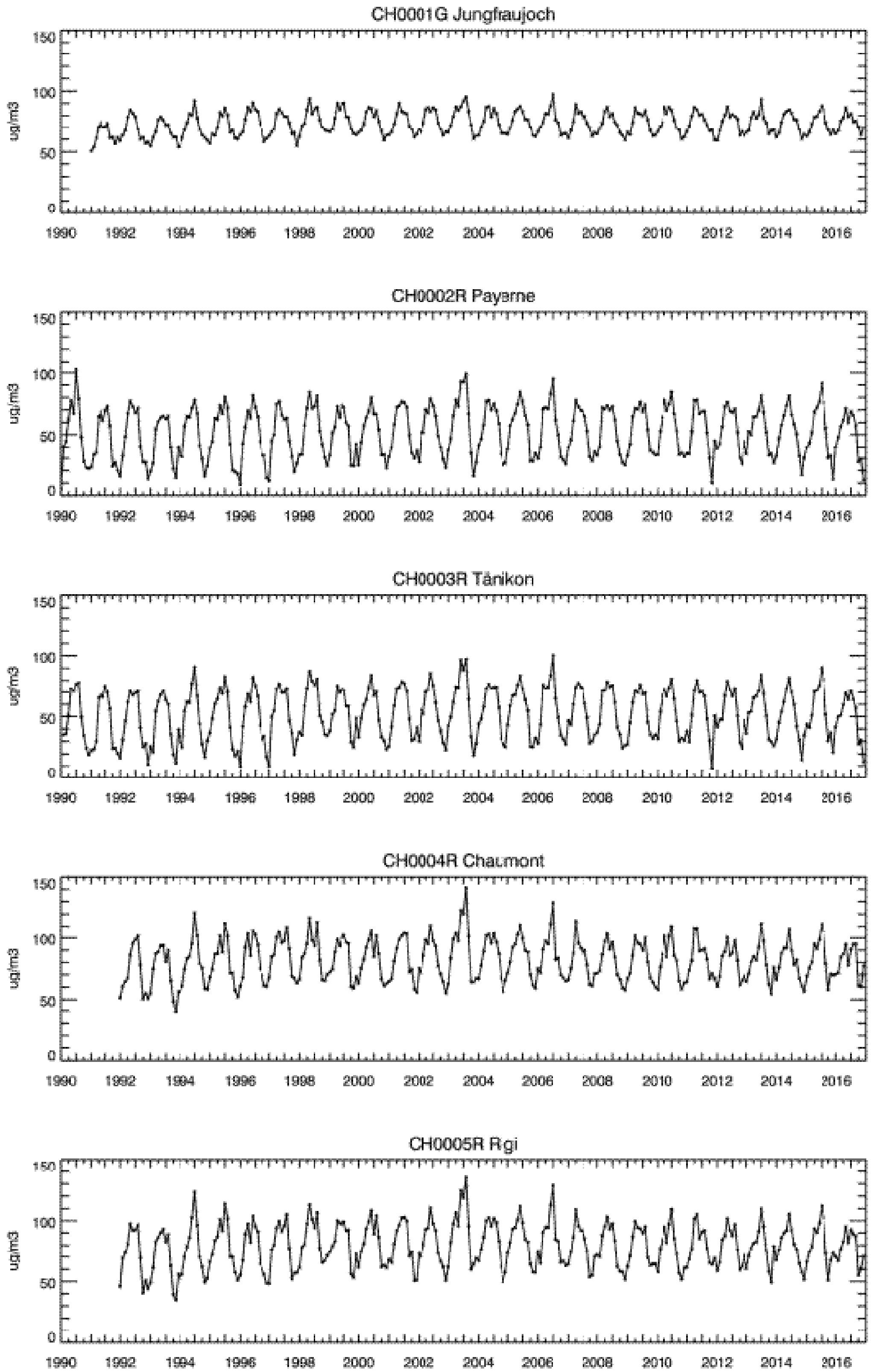

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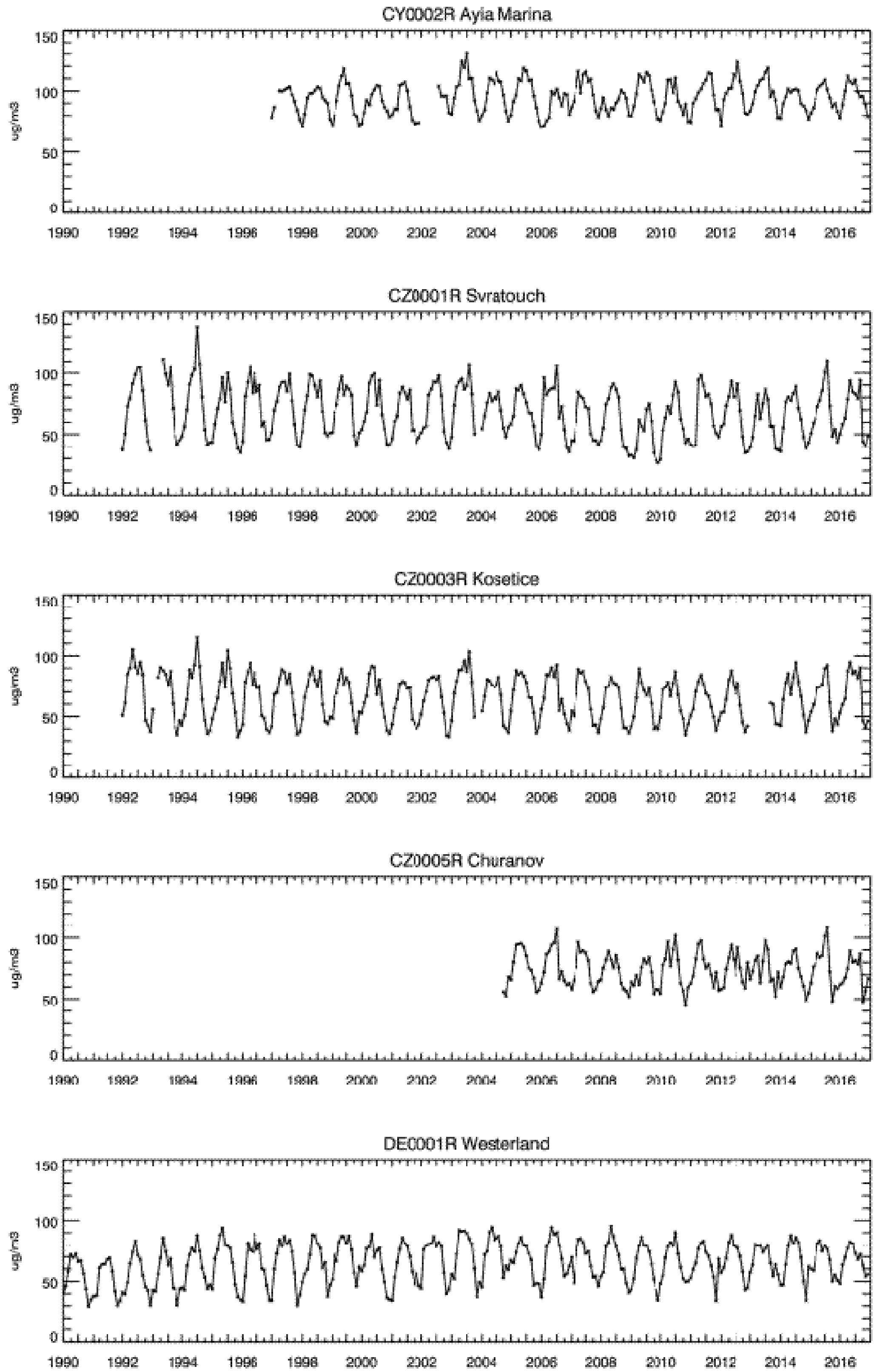

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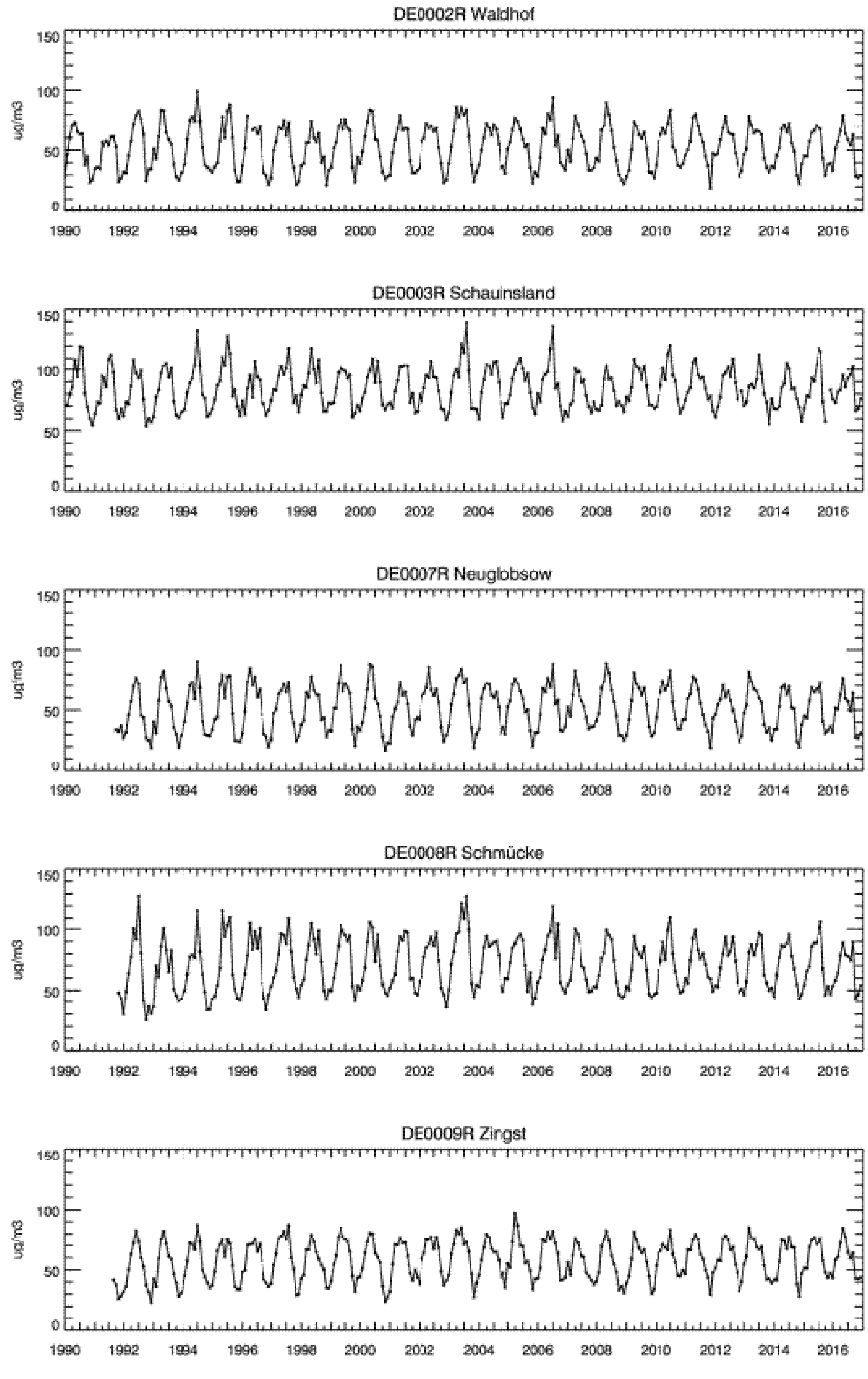

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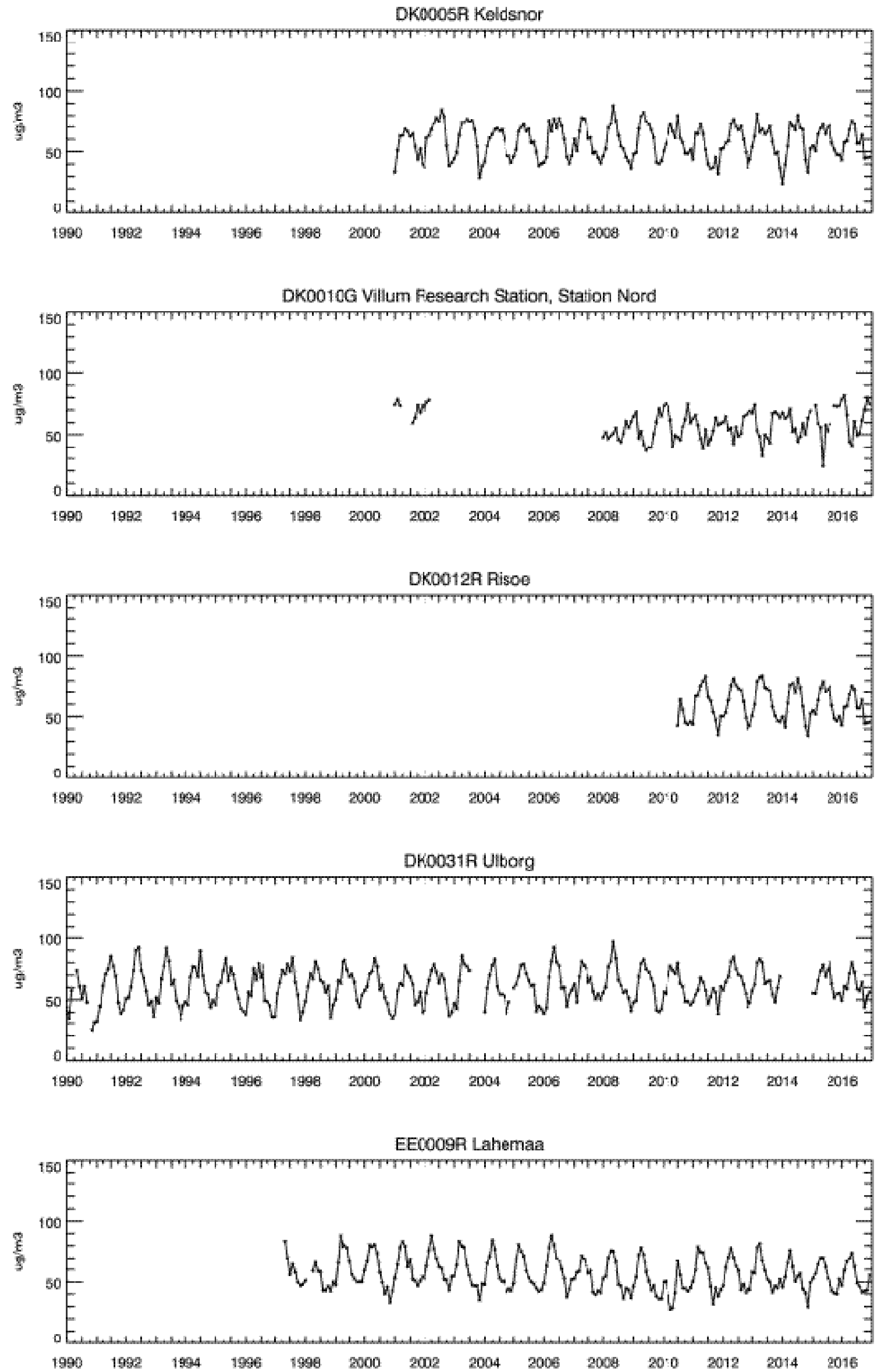

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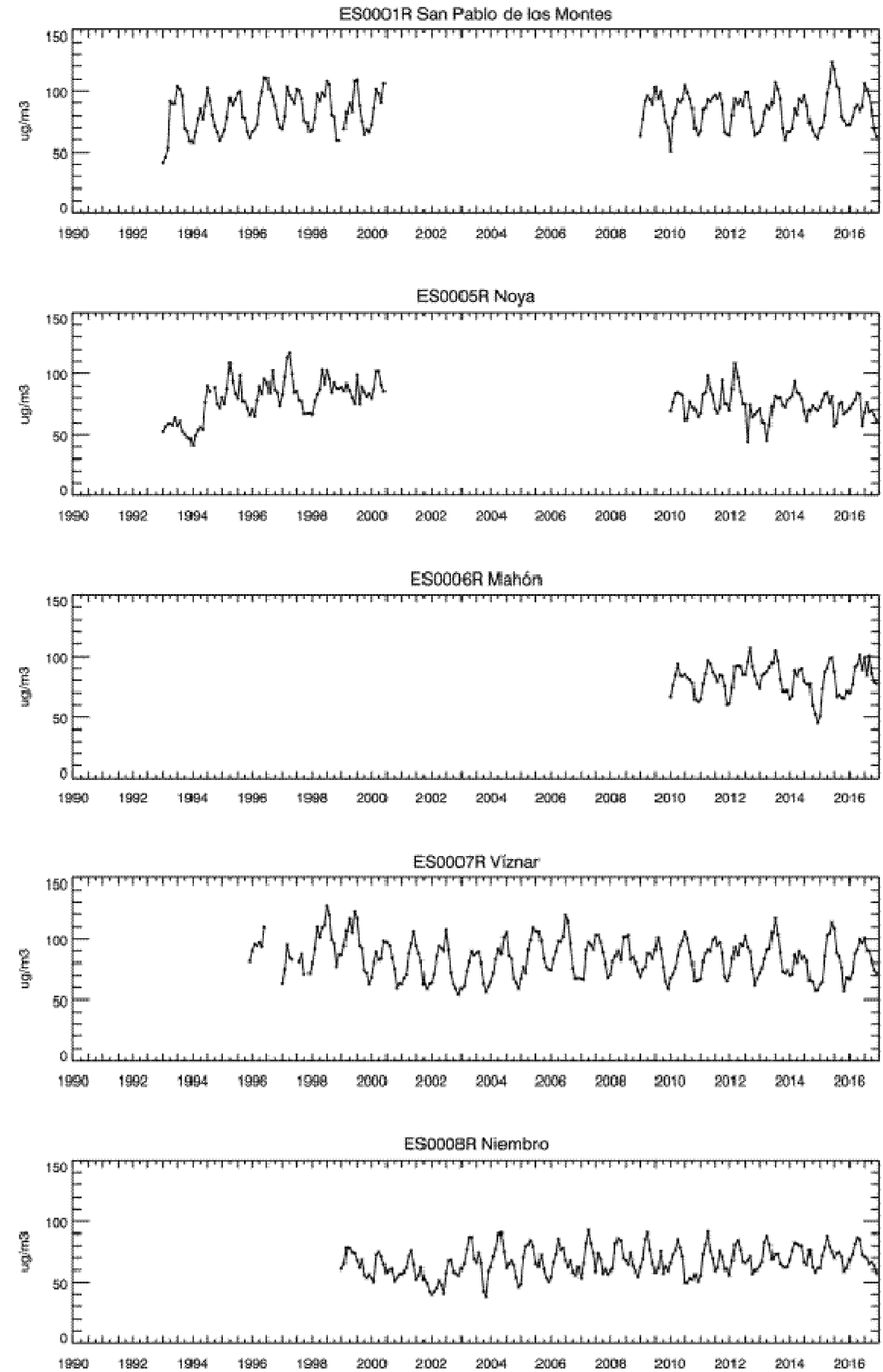

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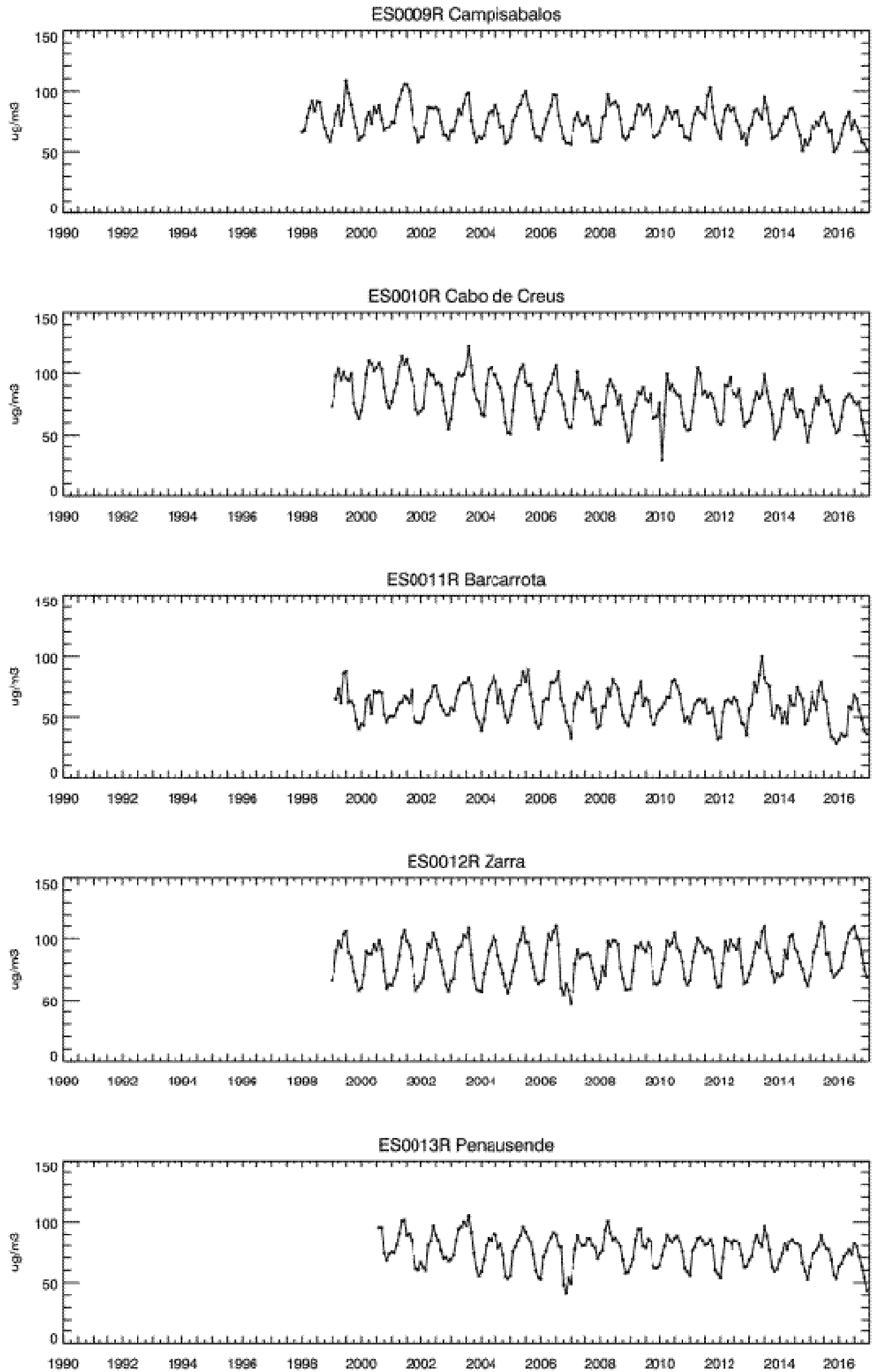

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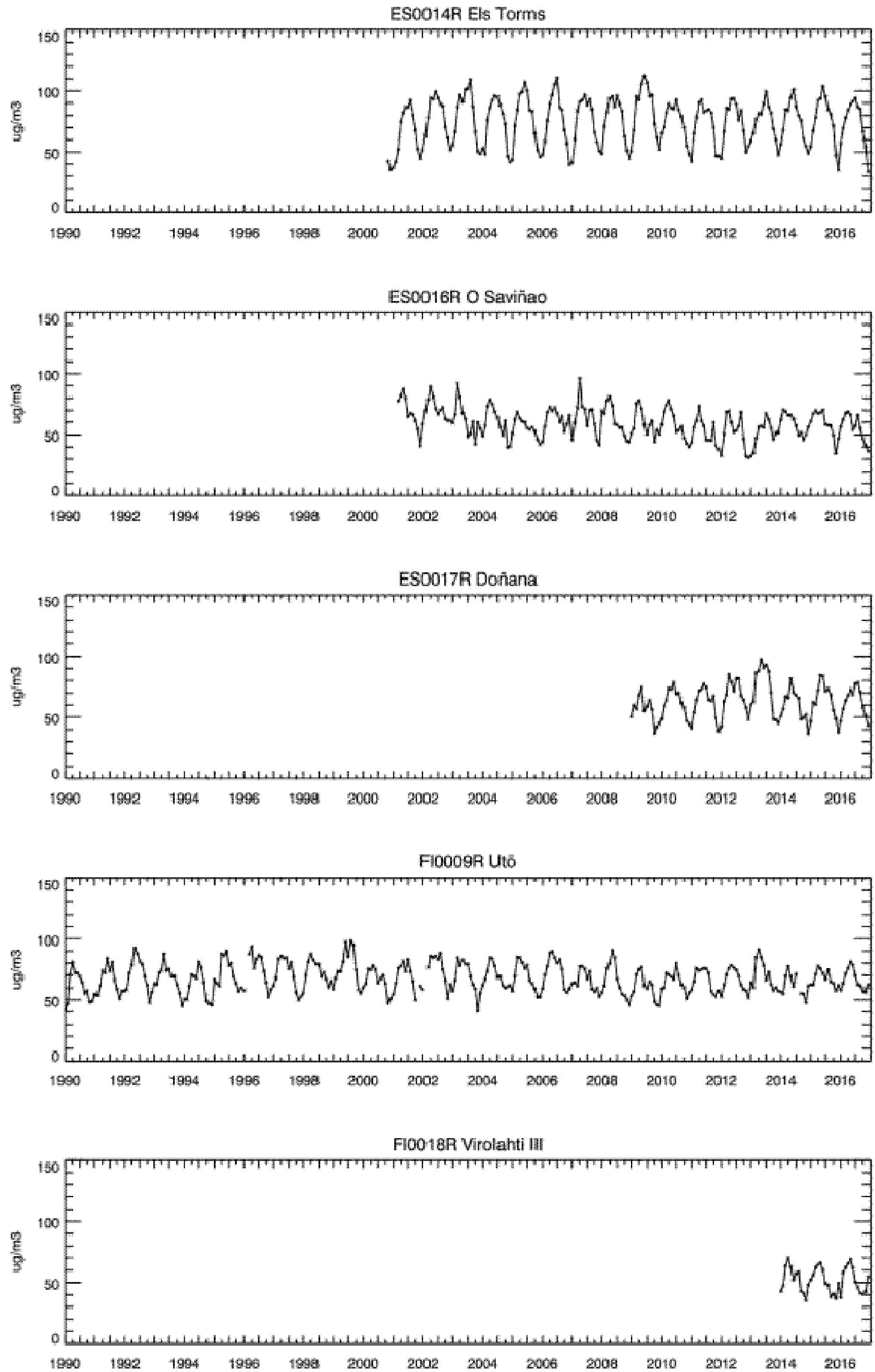

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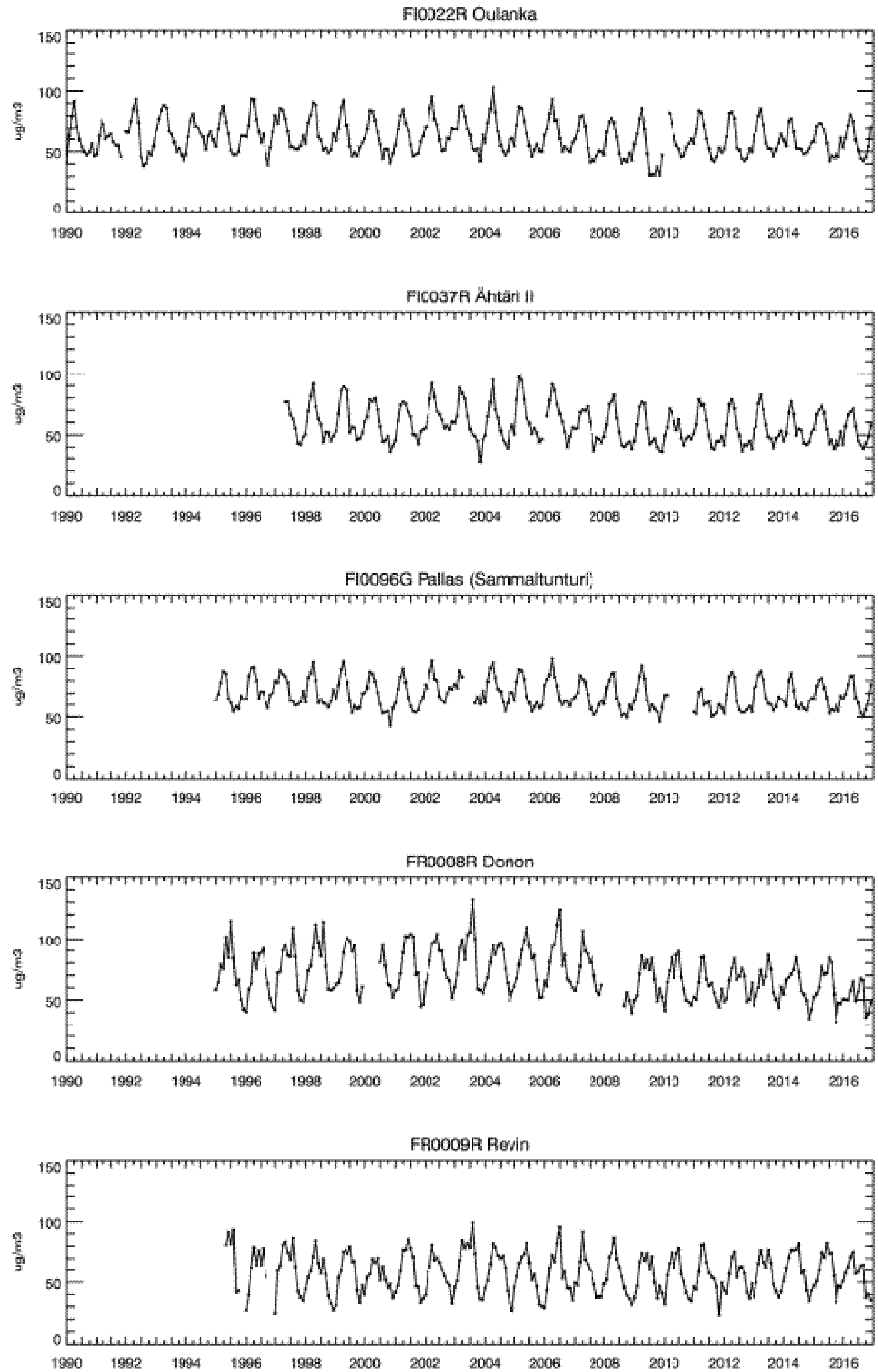

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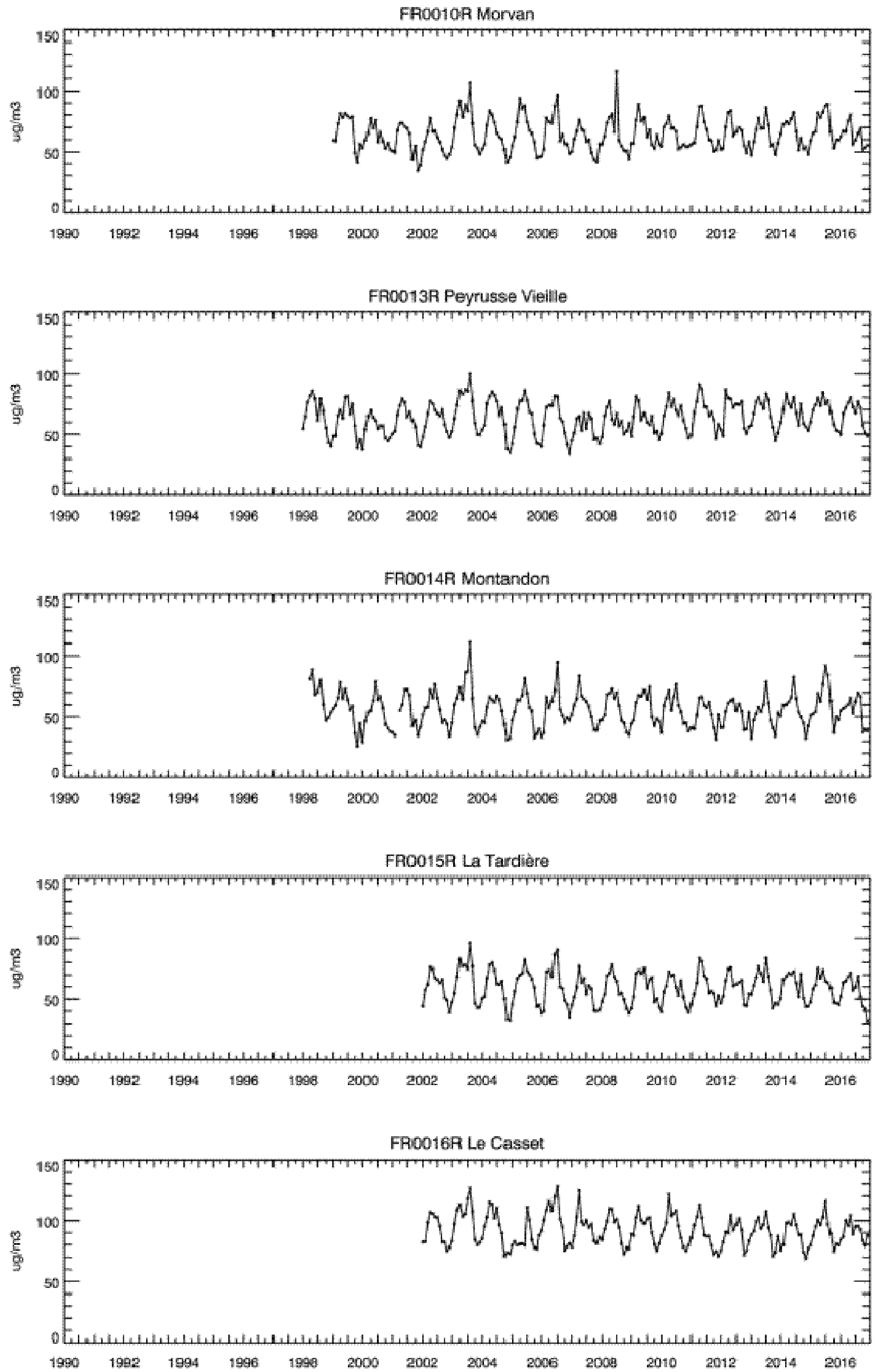

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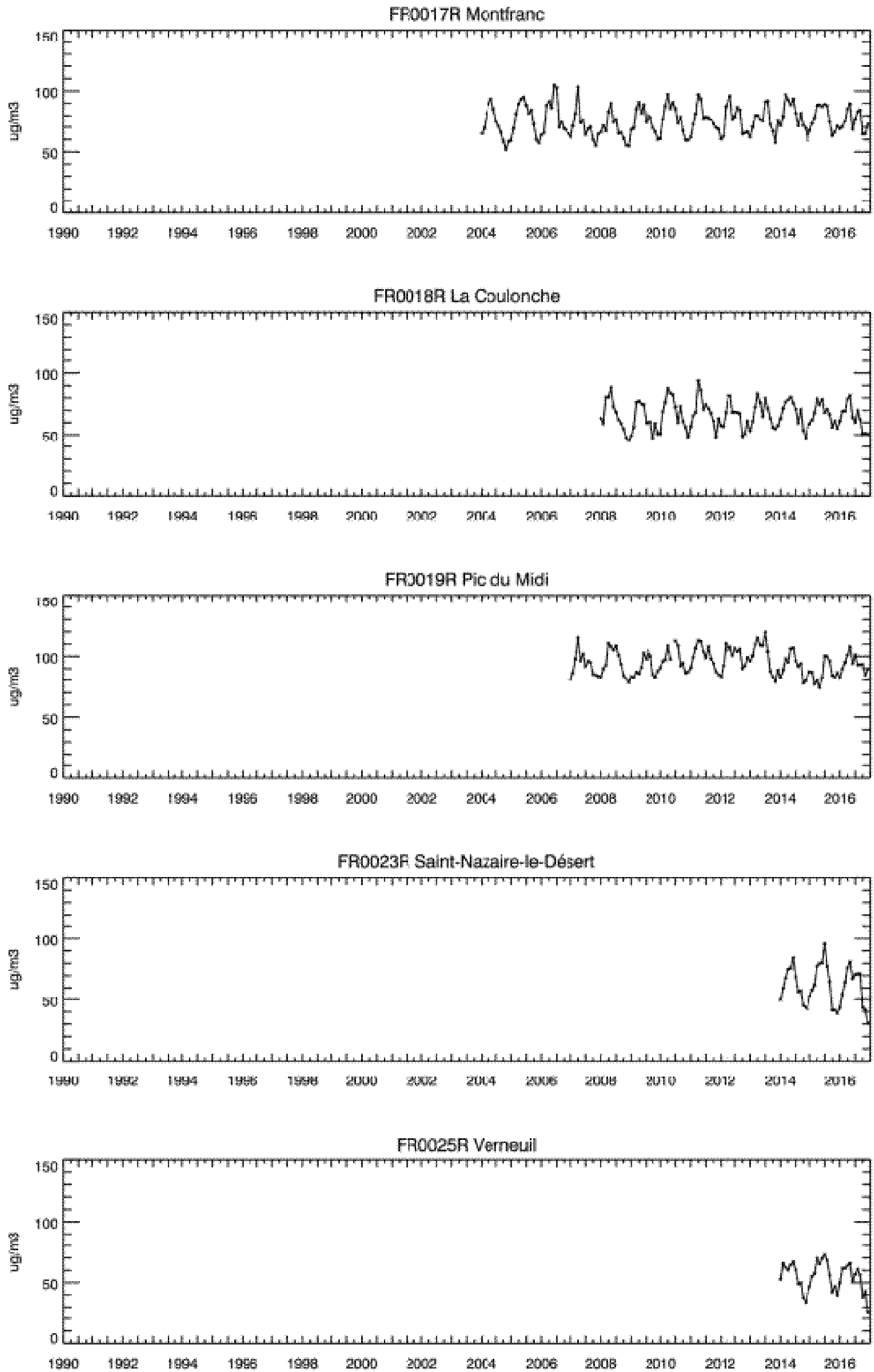

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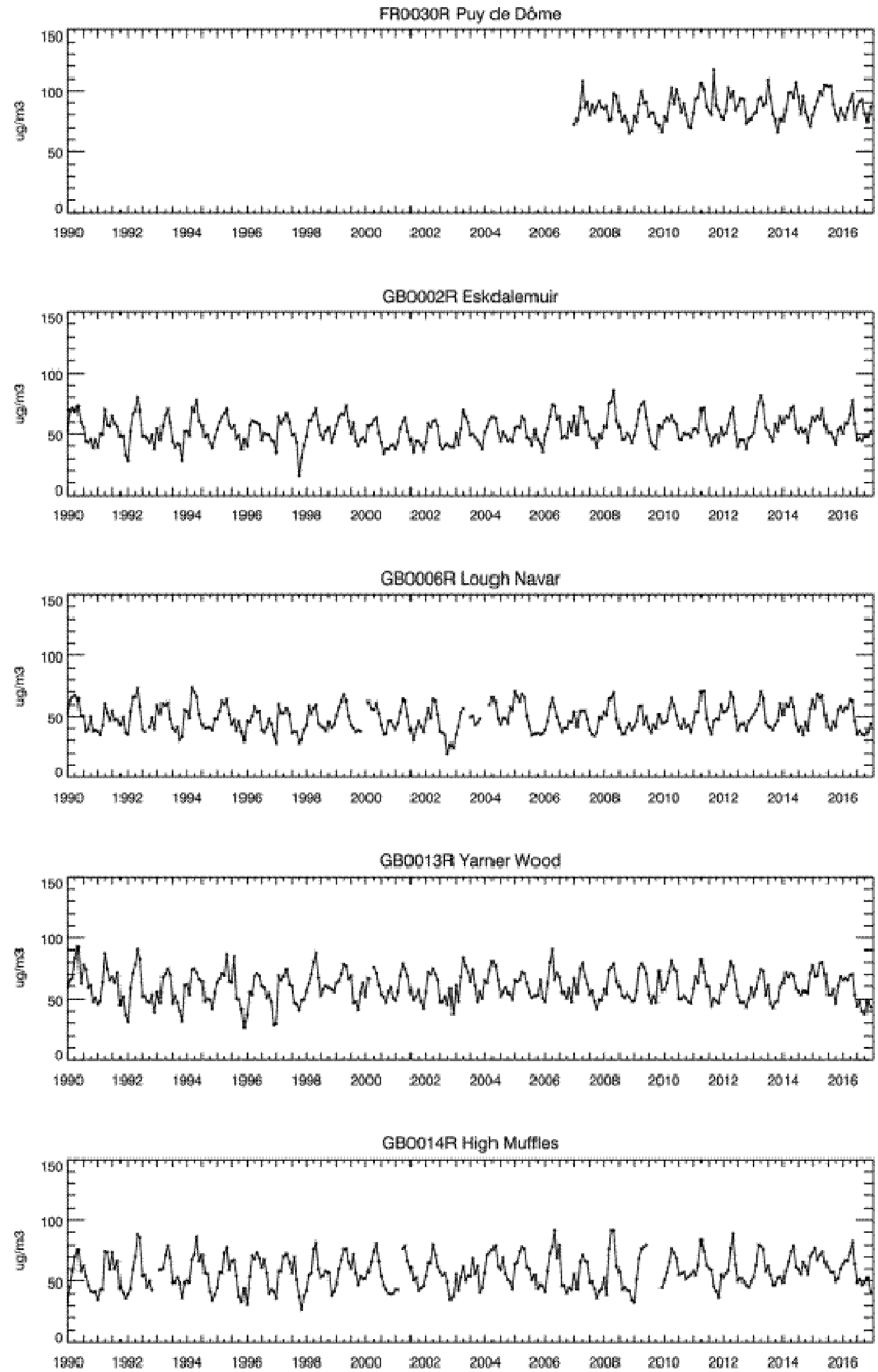

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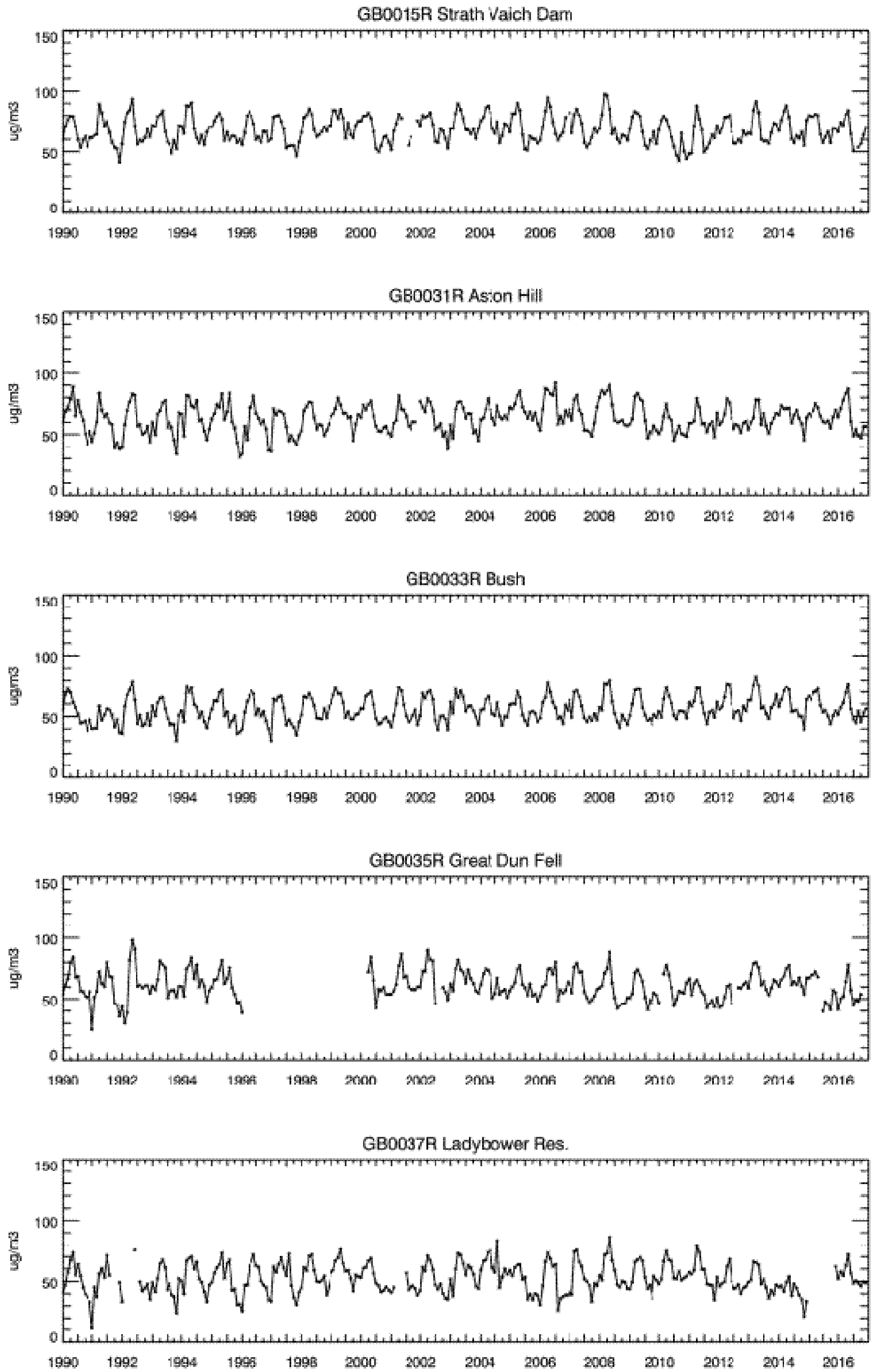

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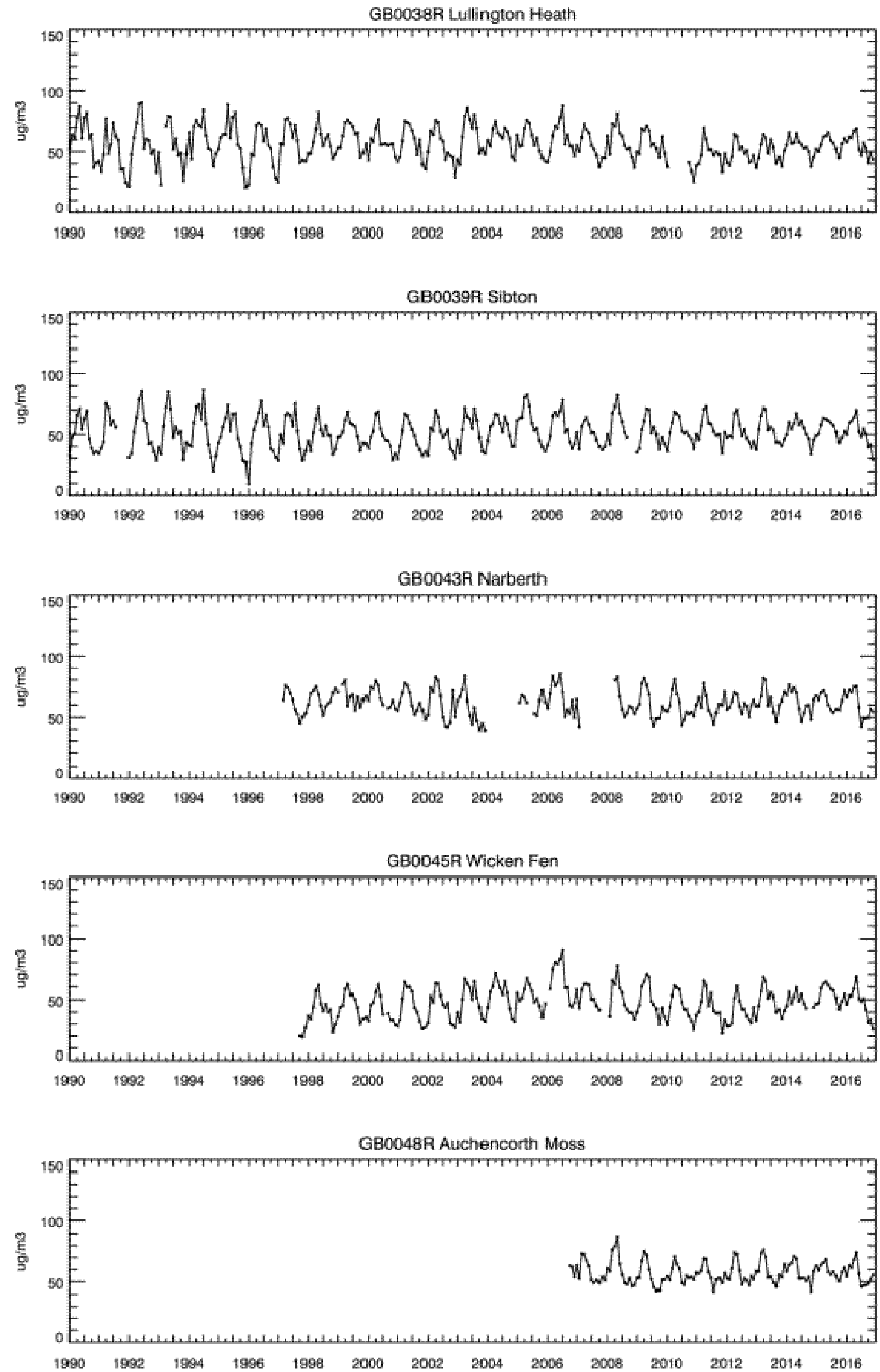
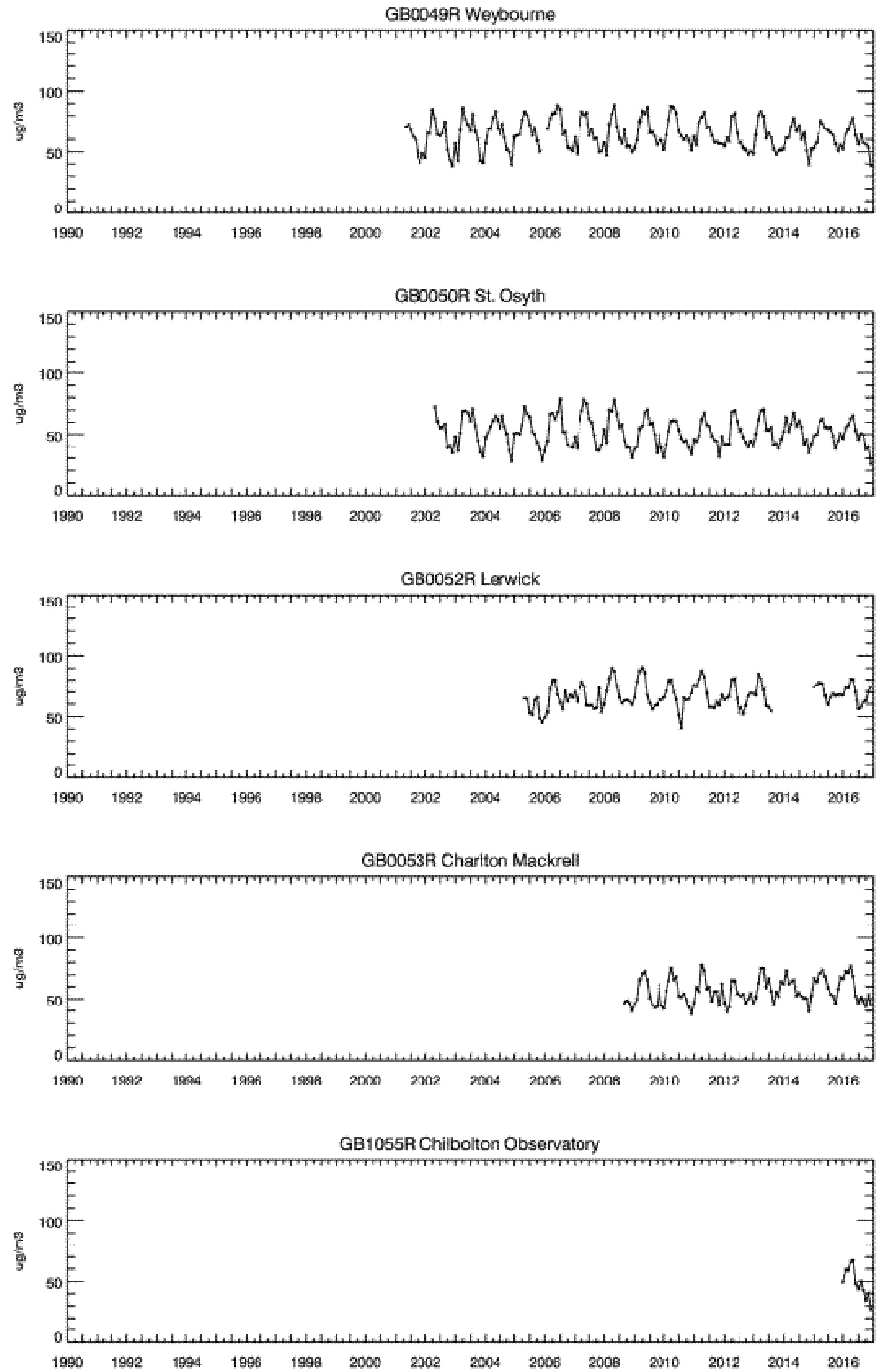


Figure 3.1, cont.



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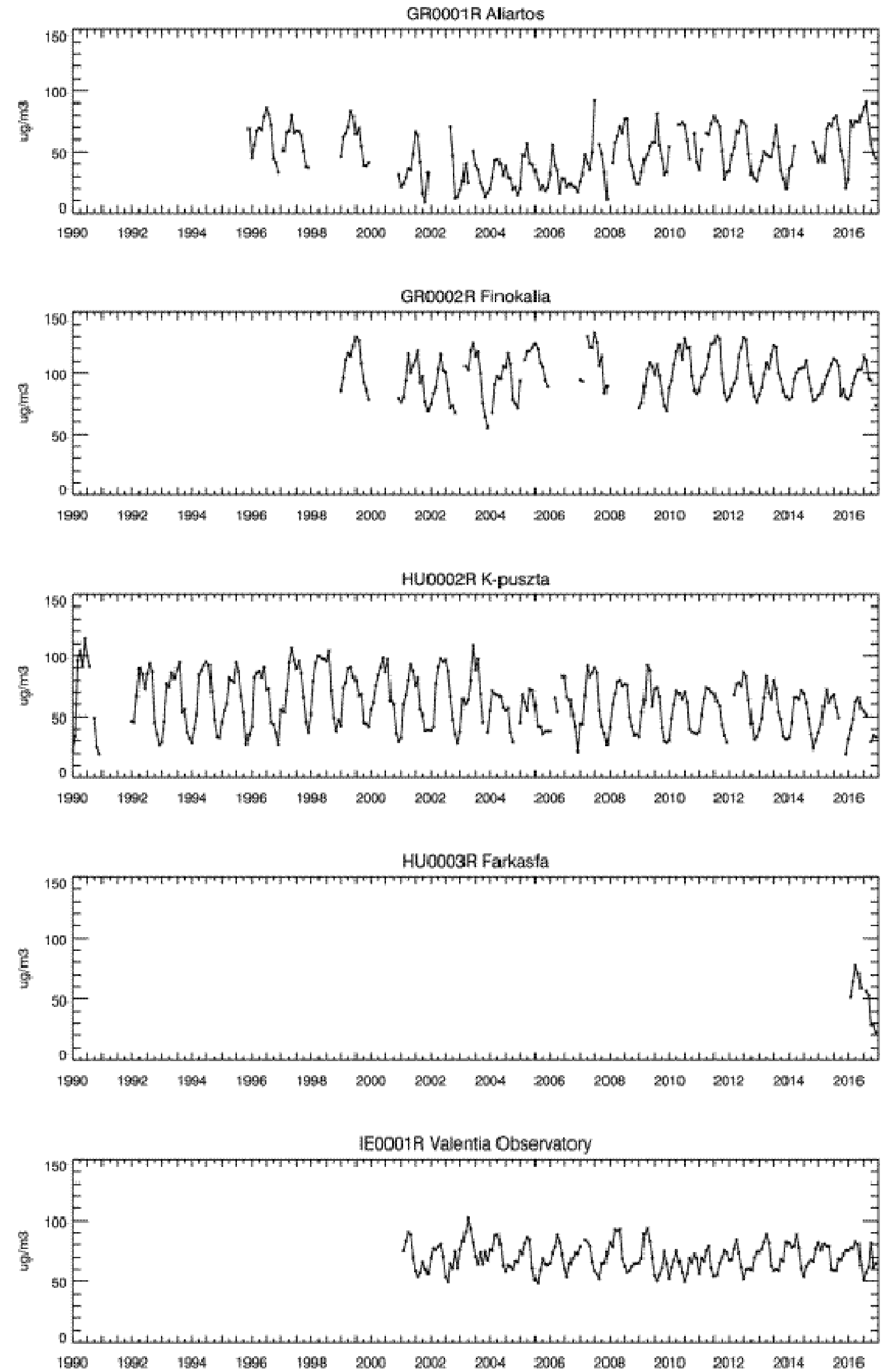

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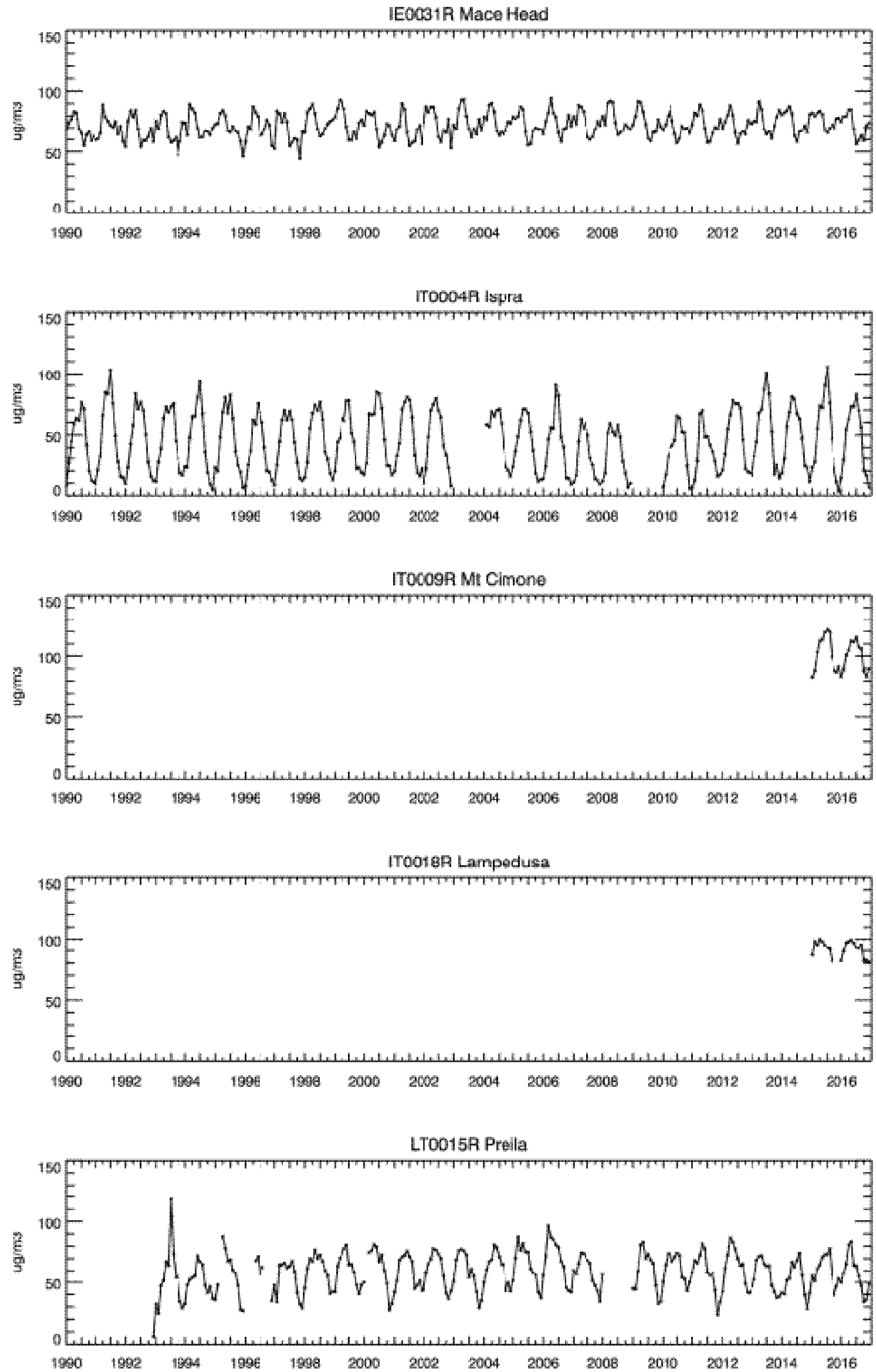

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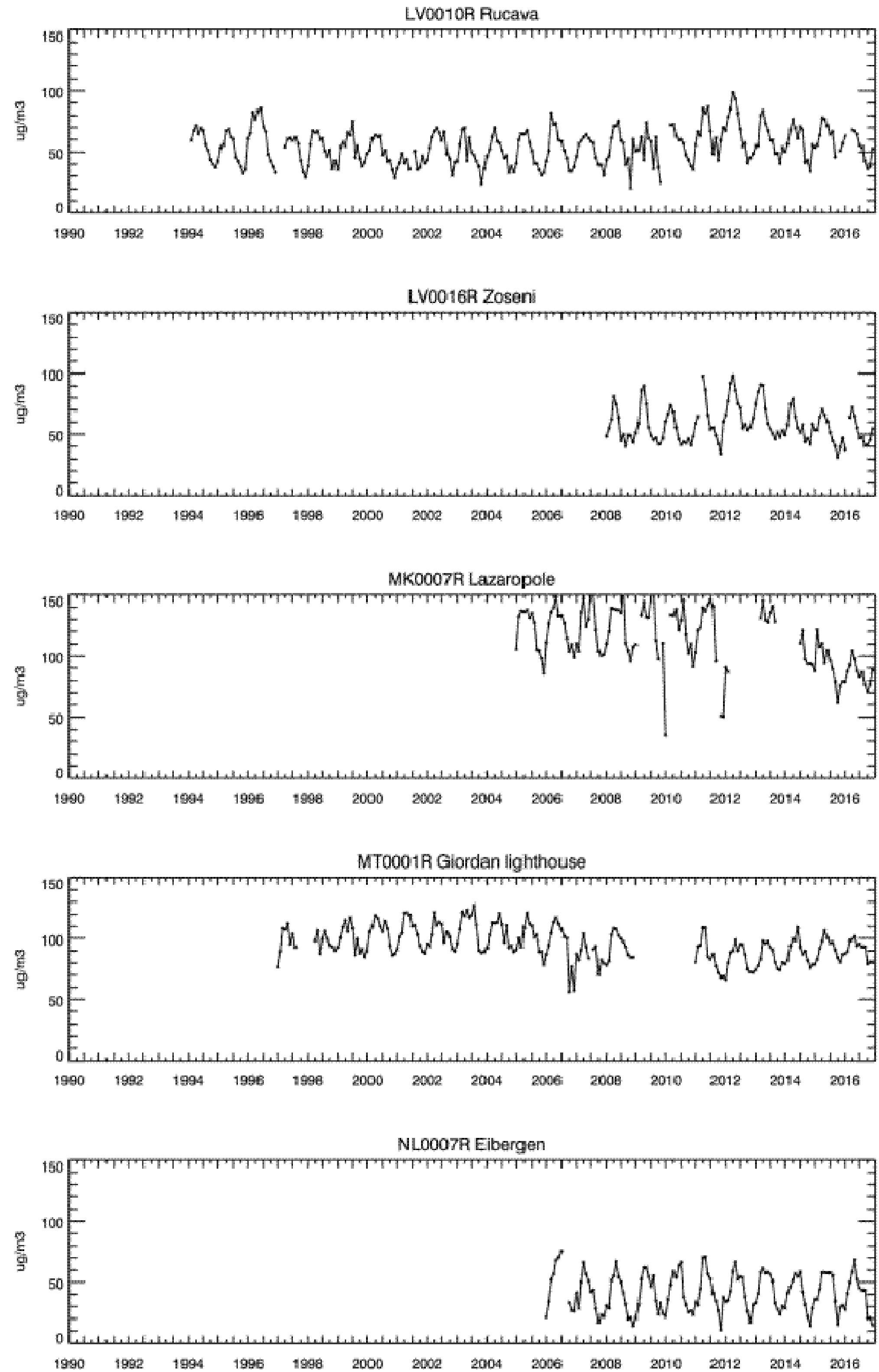

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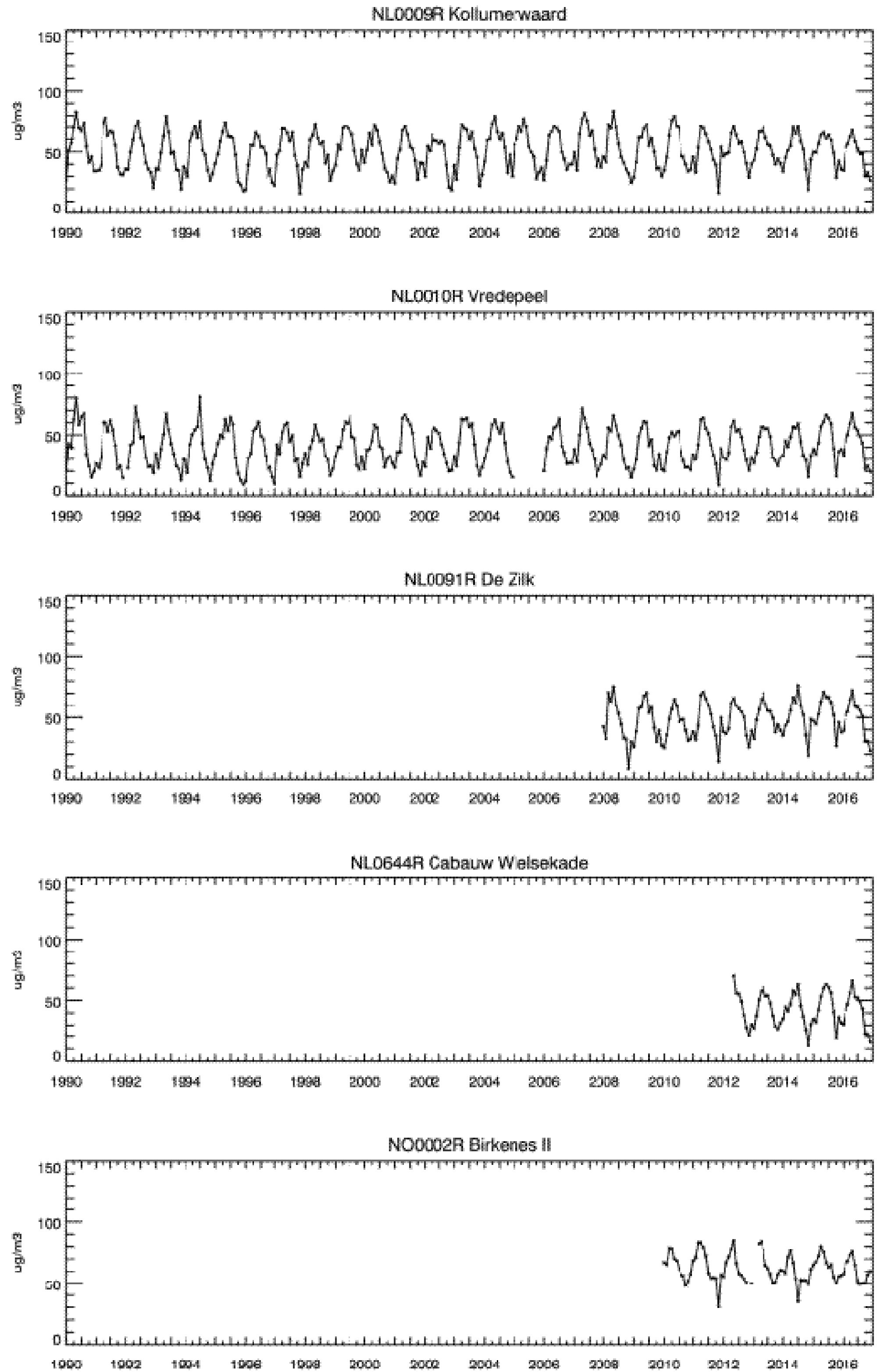

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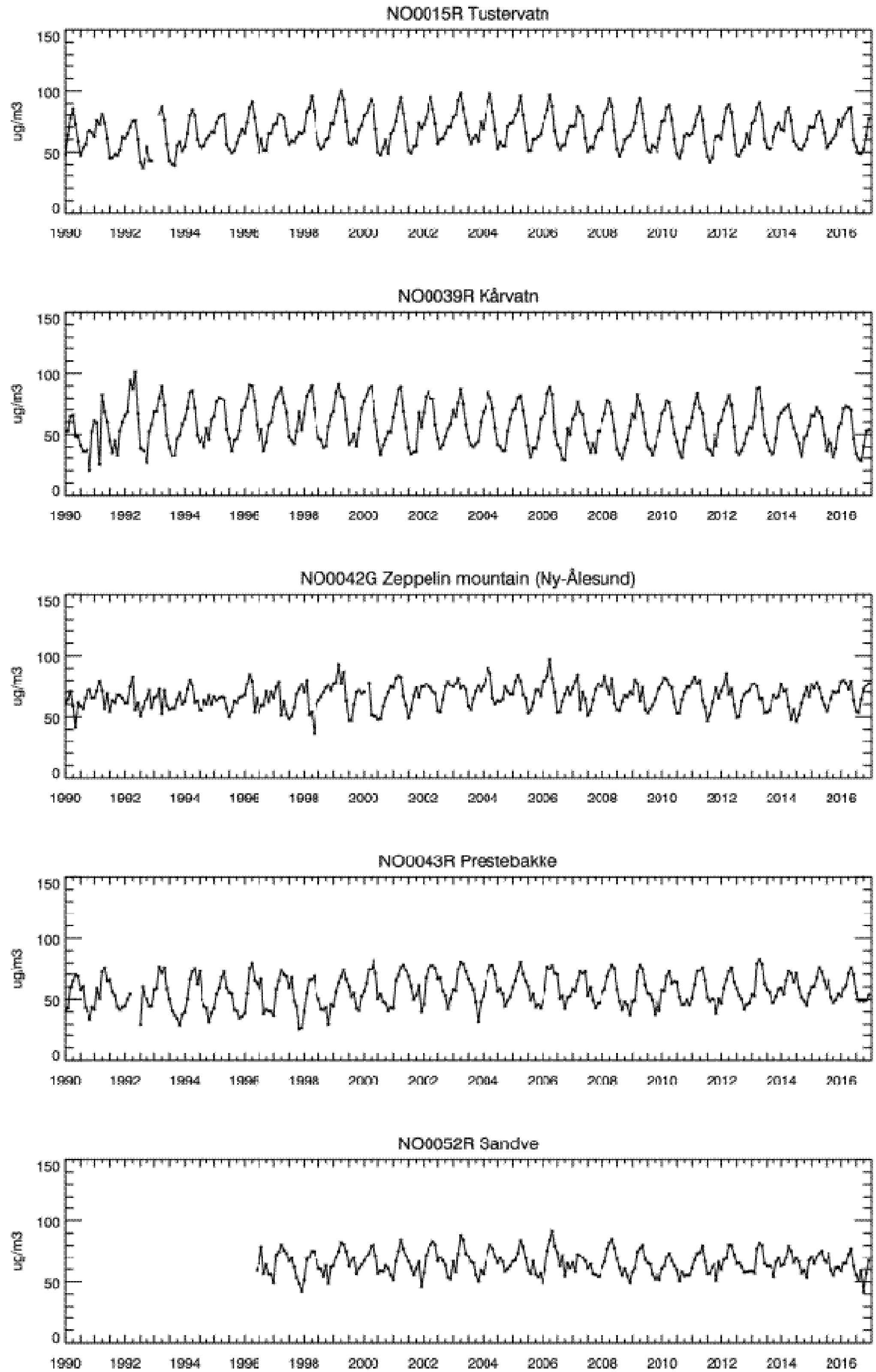

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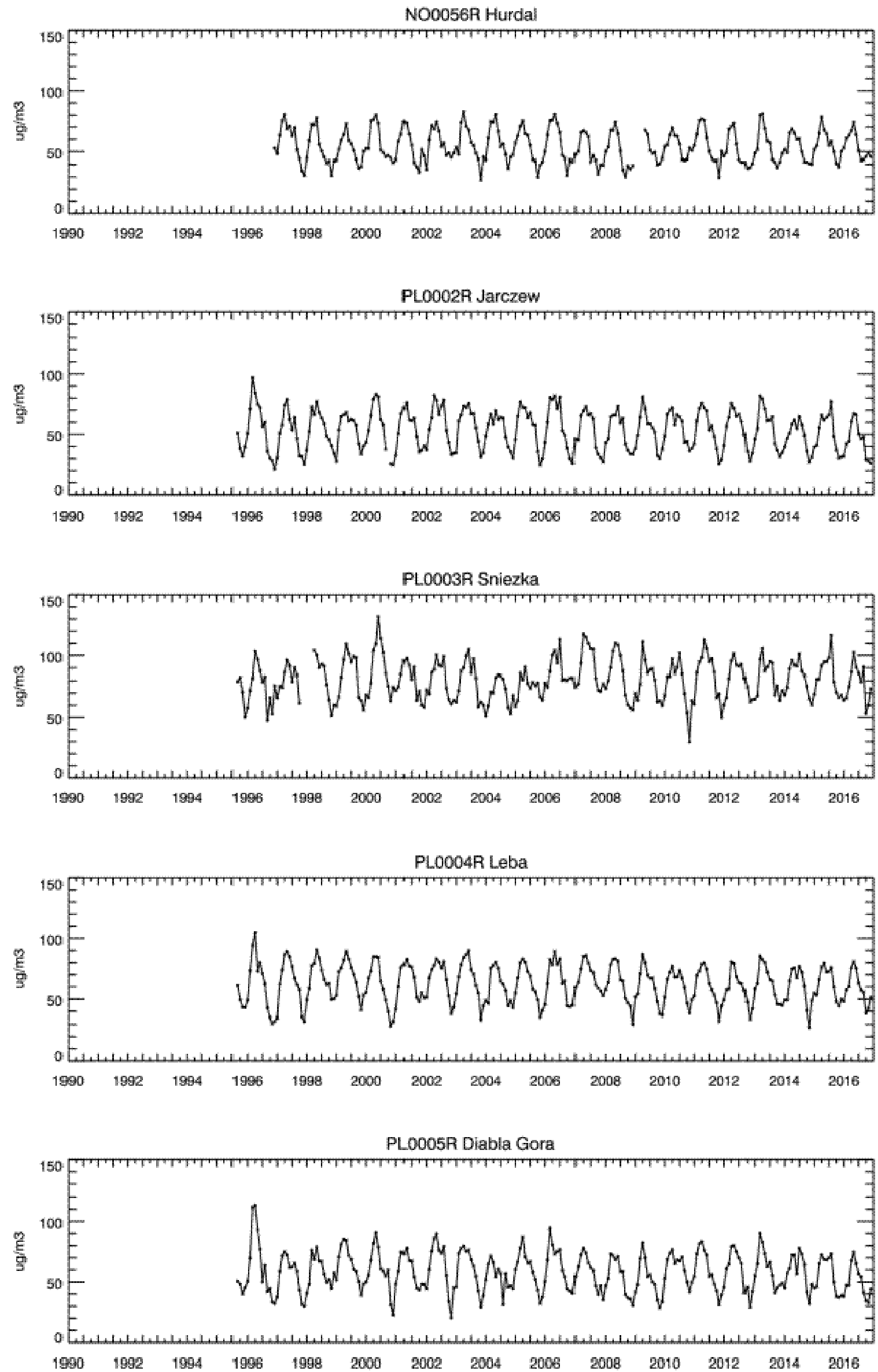

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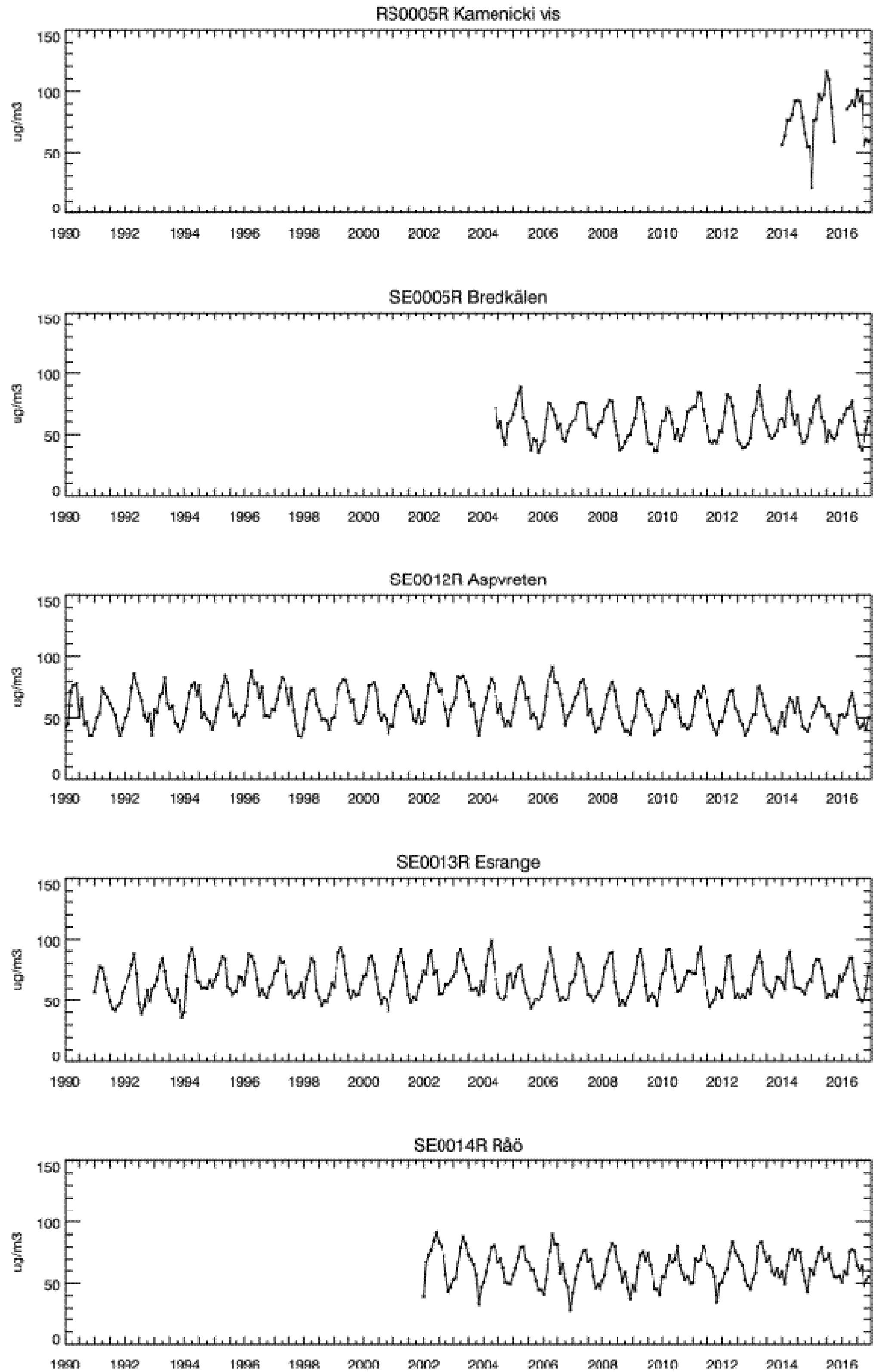

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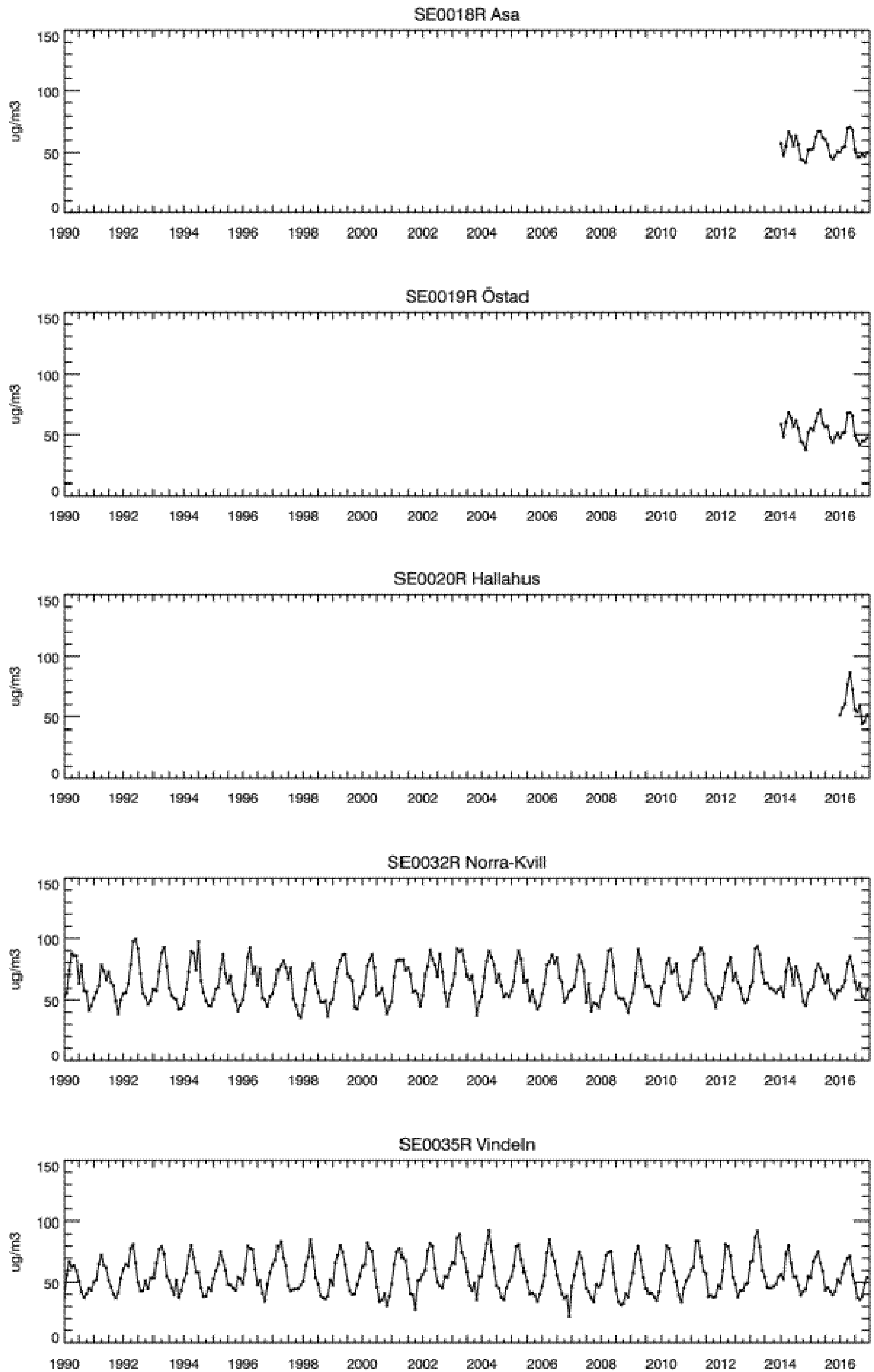

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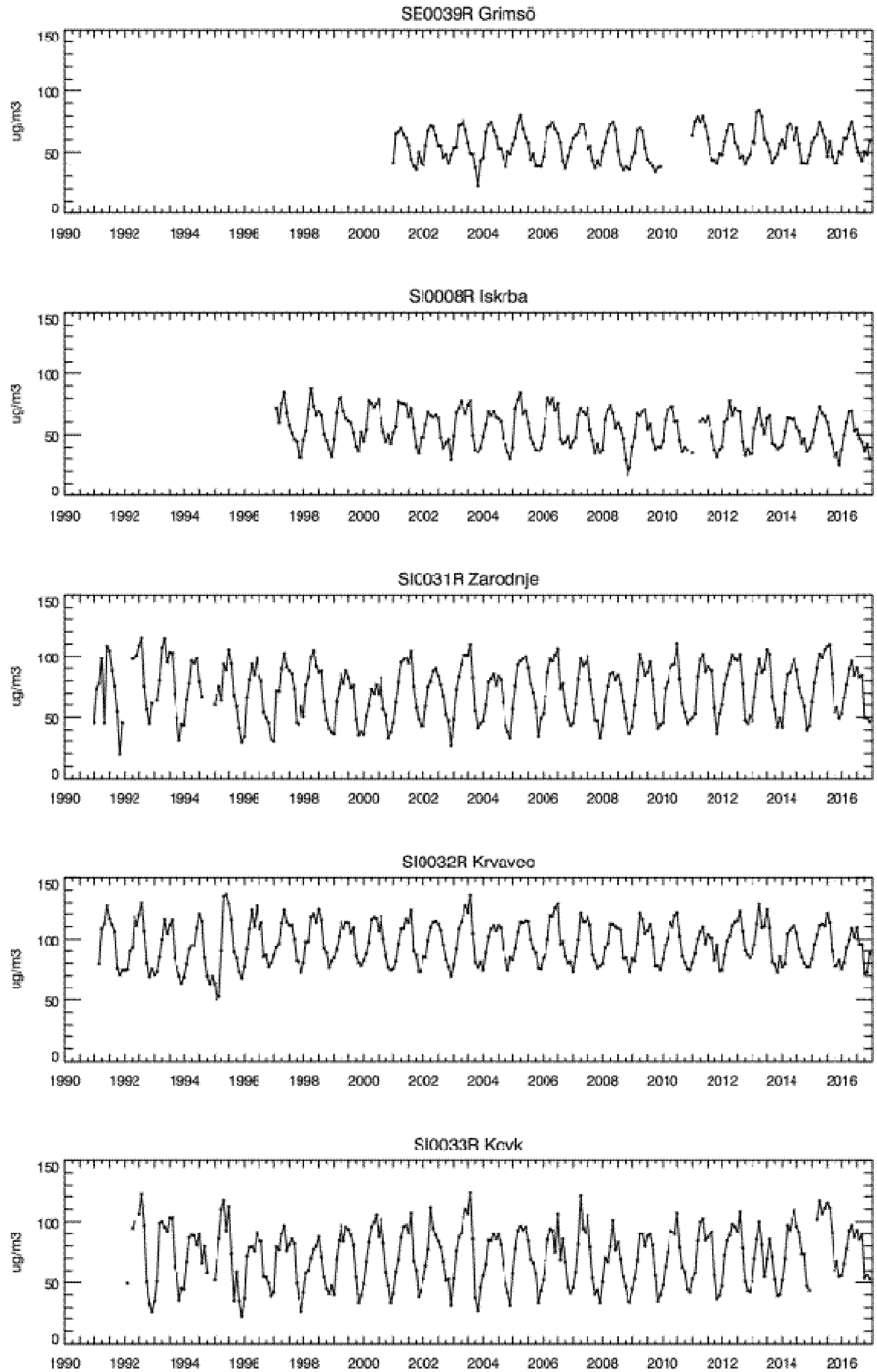

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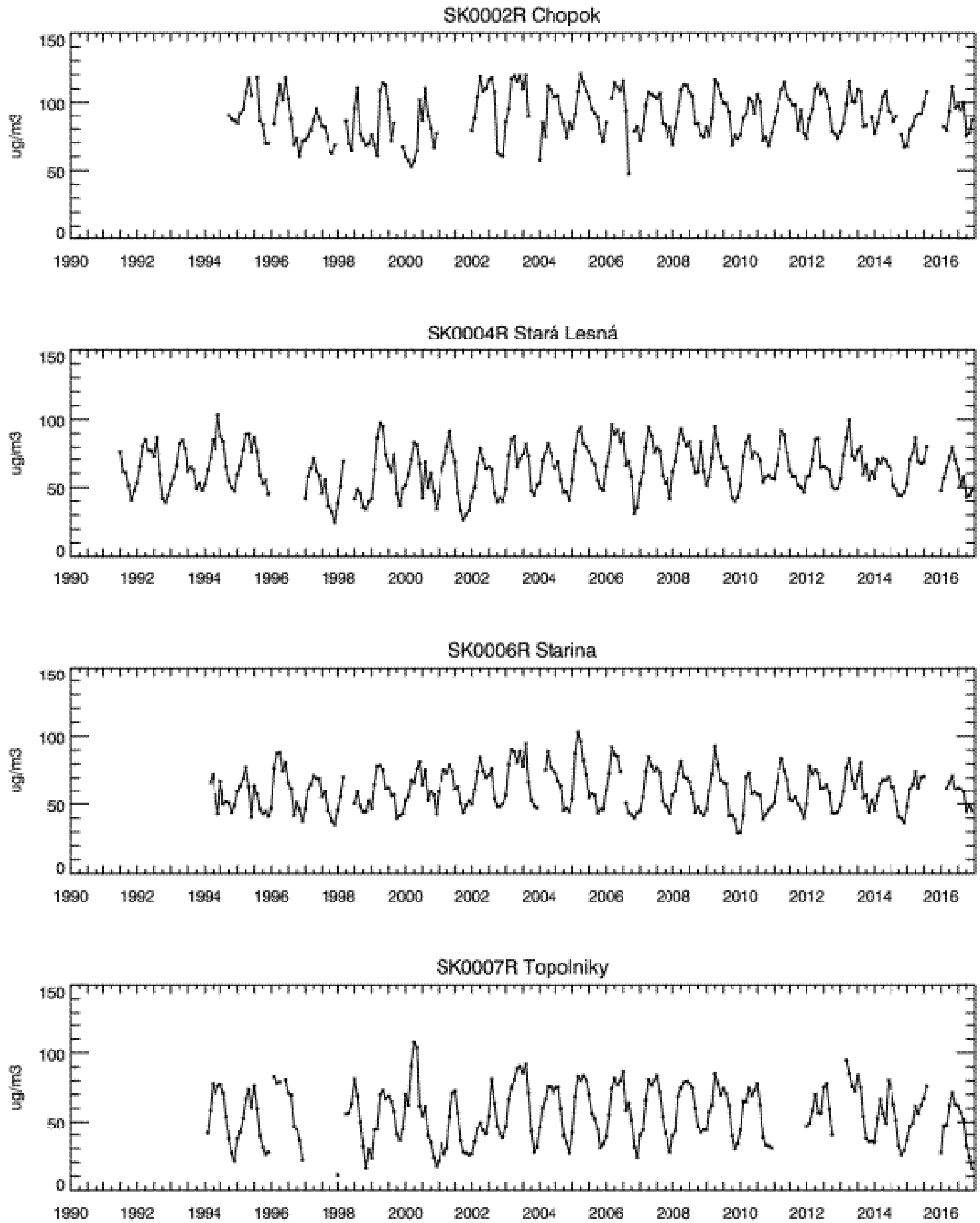


Figure 3.1, cont.

Annex 4

Diurnal variation,
April–September 2016

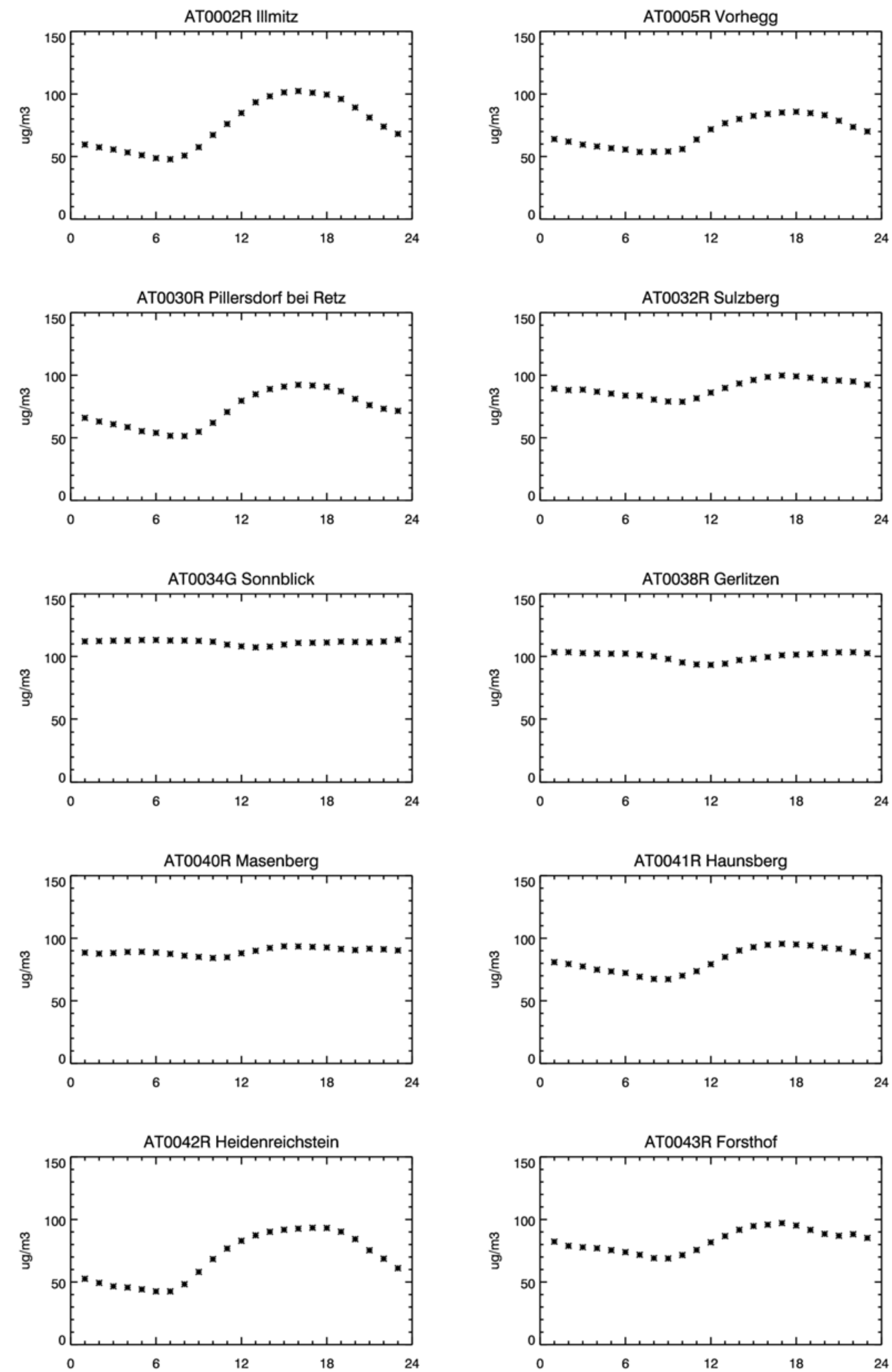


Figure 4.1: Diurnal variation, April–September 2015.

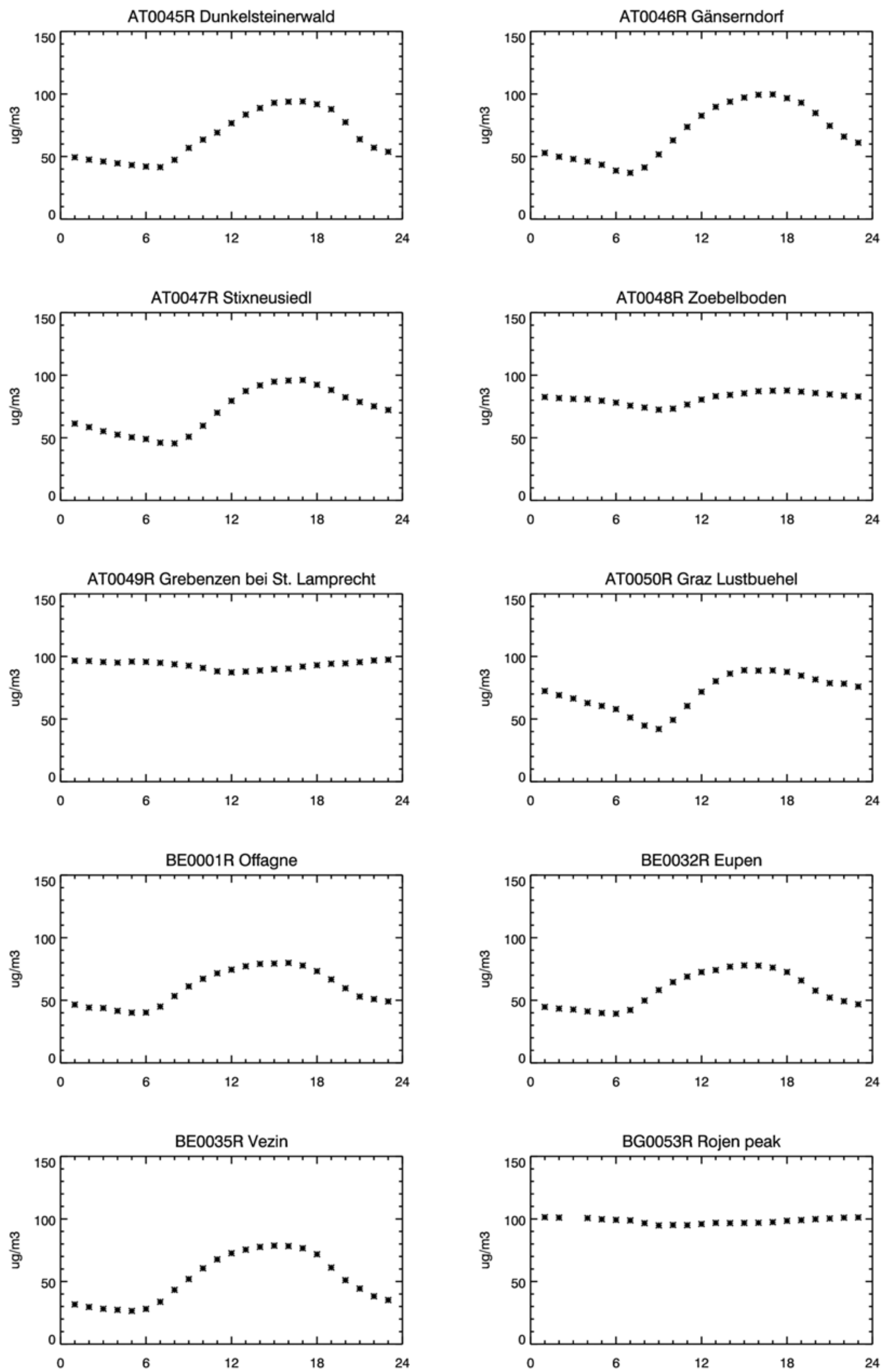


Figure 4.1, cont.

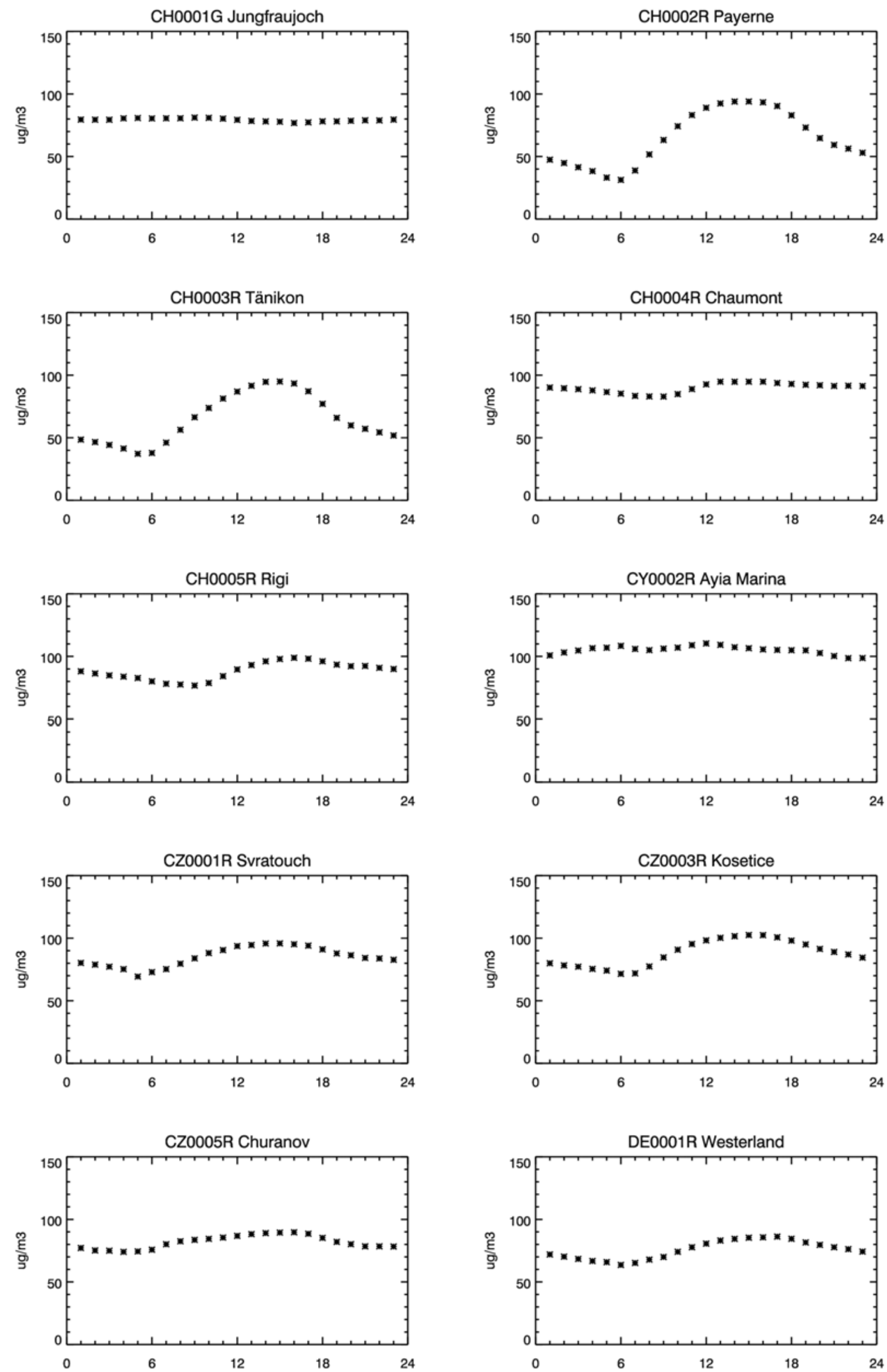
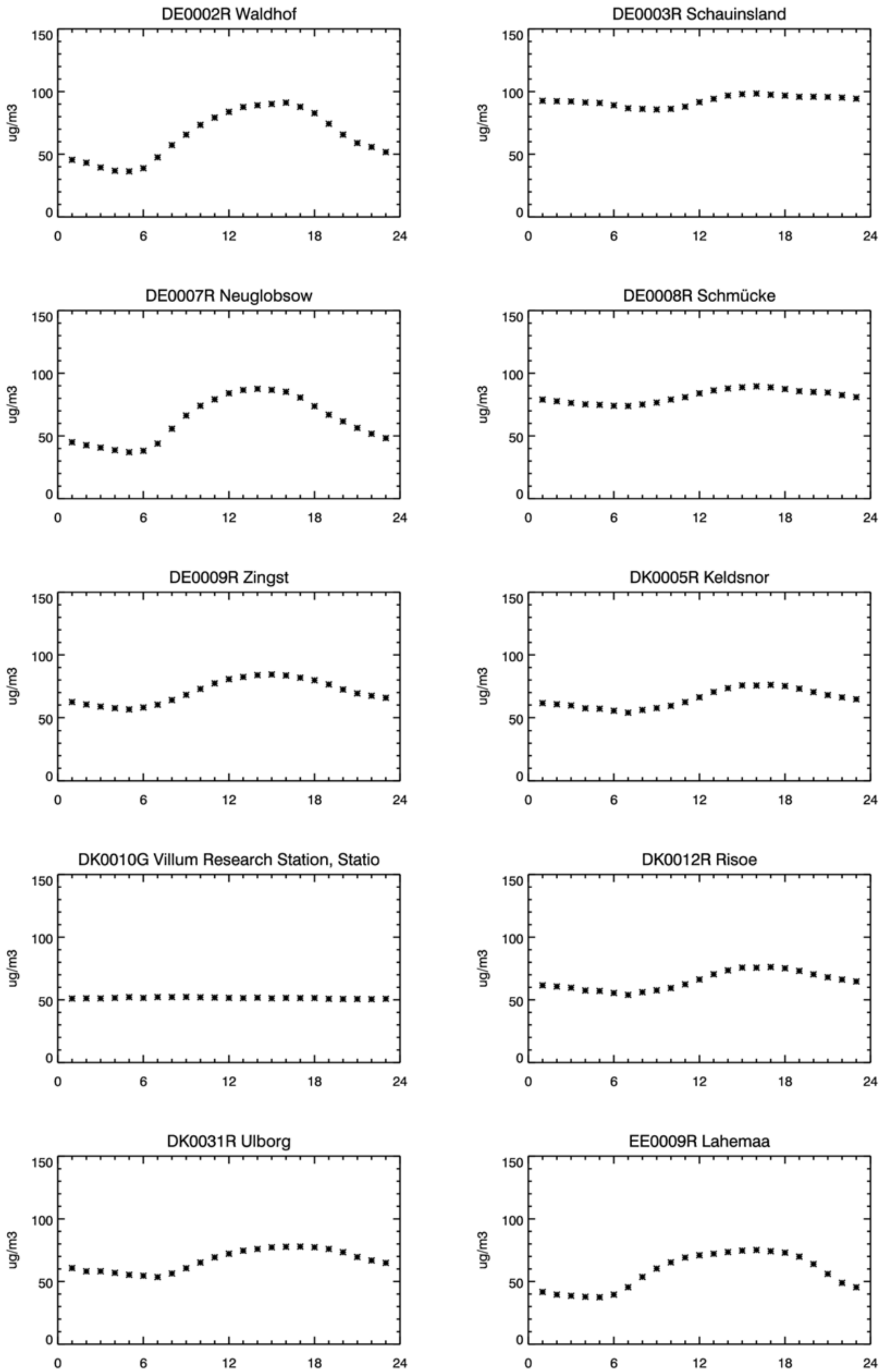


Figure 4.1, cont.



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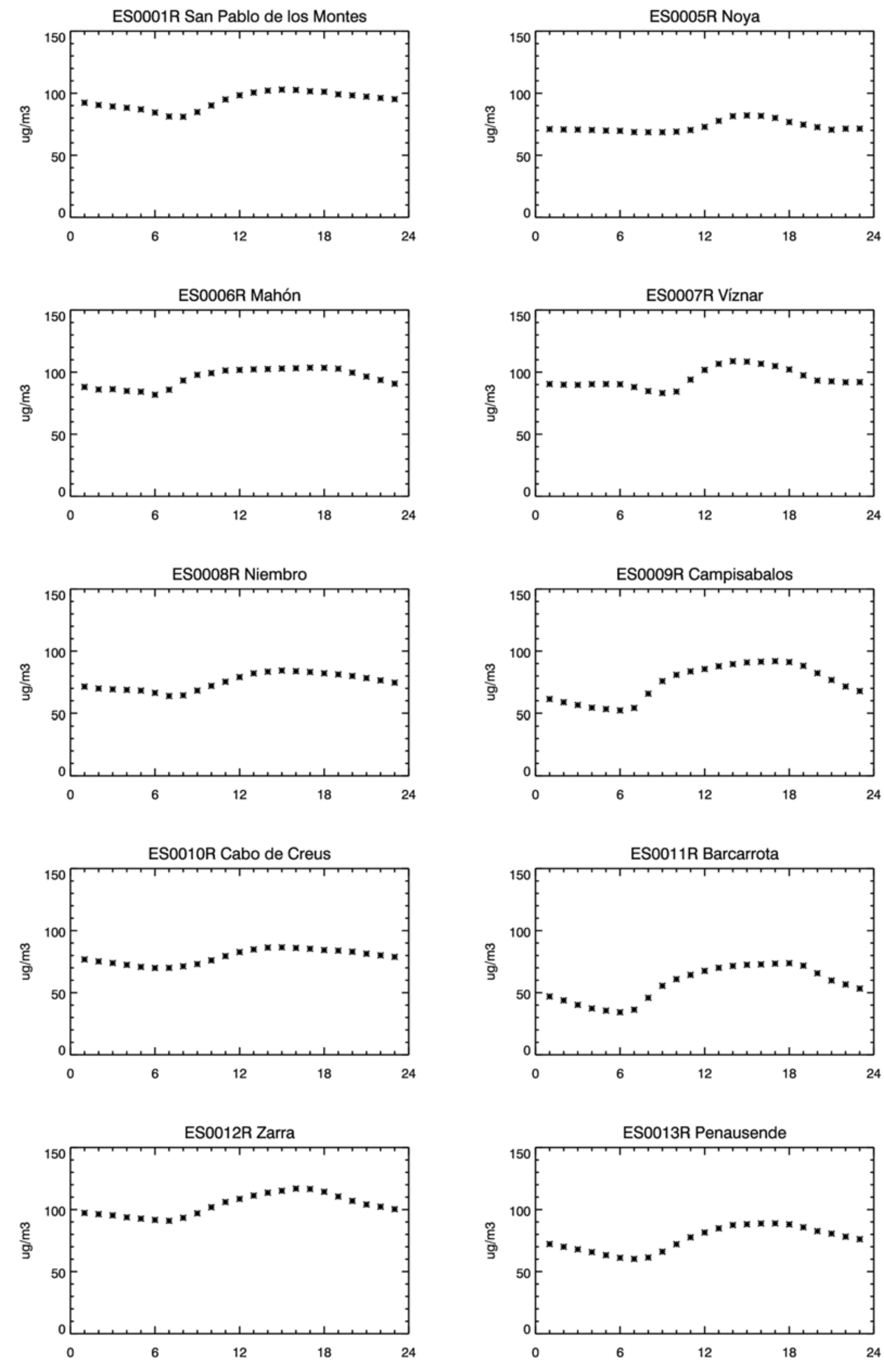

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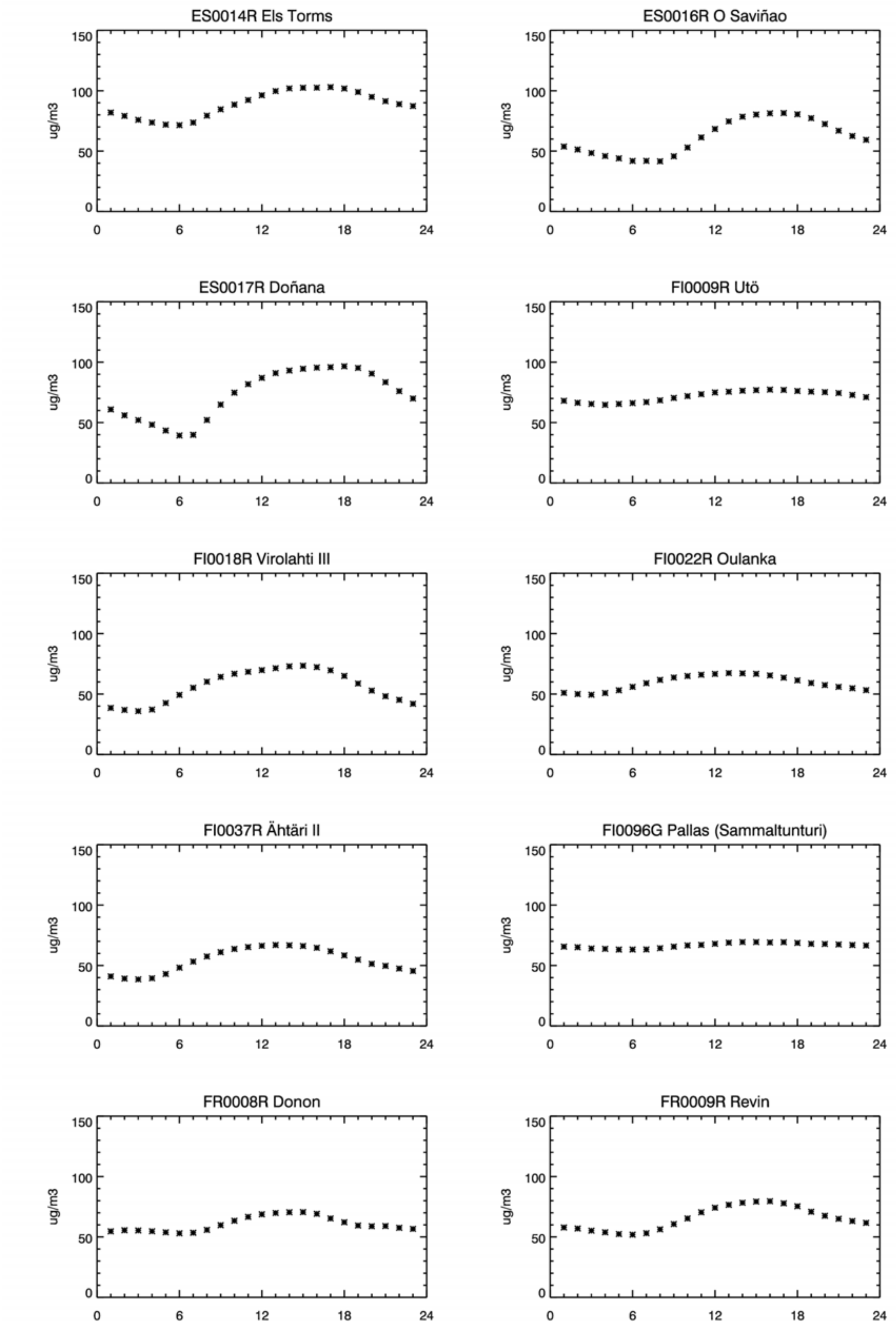

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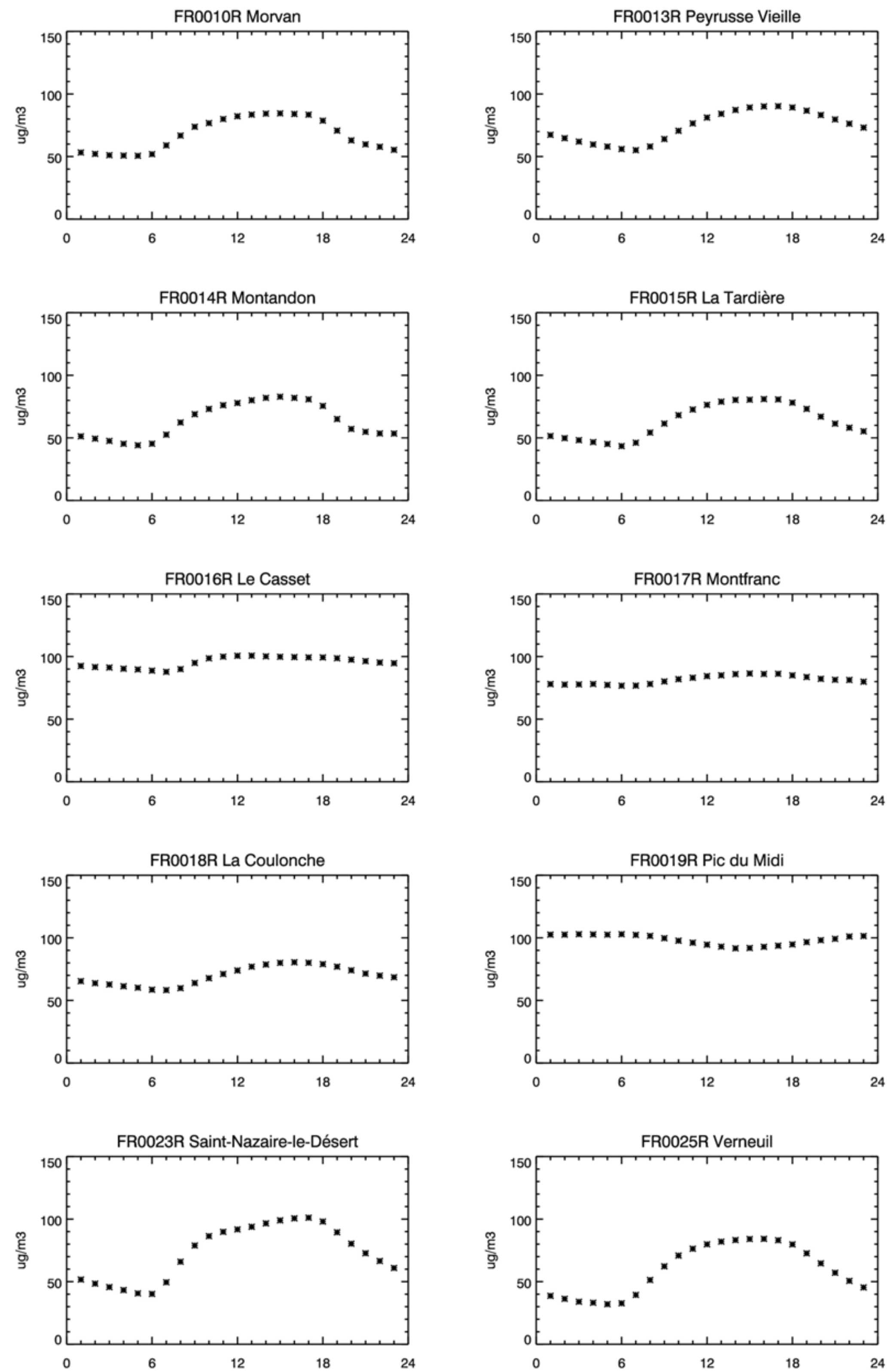

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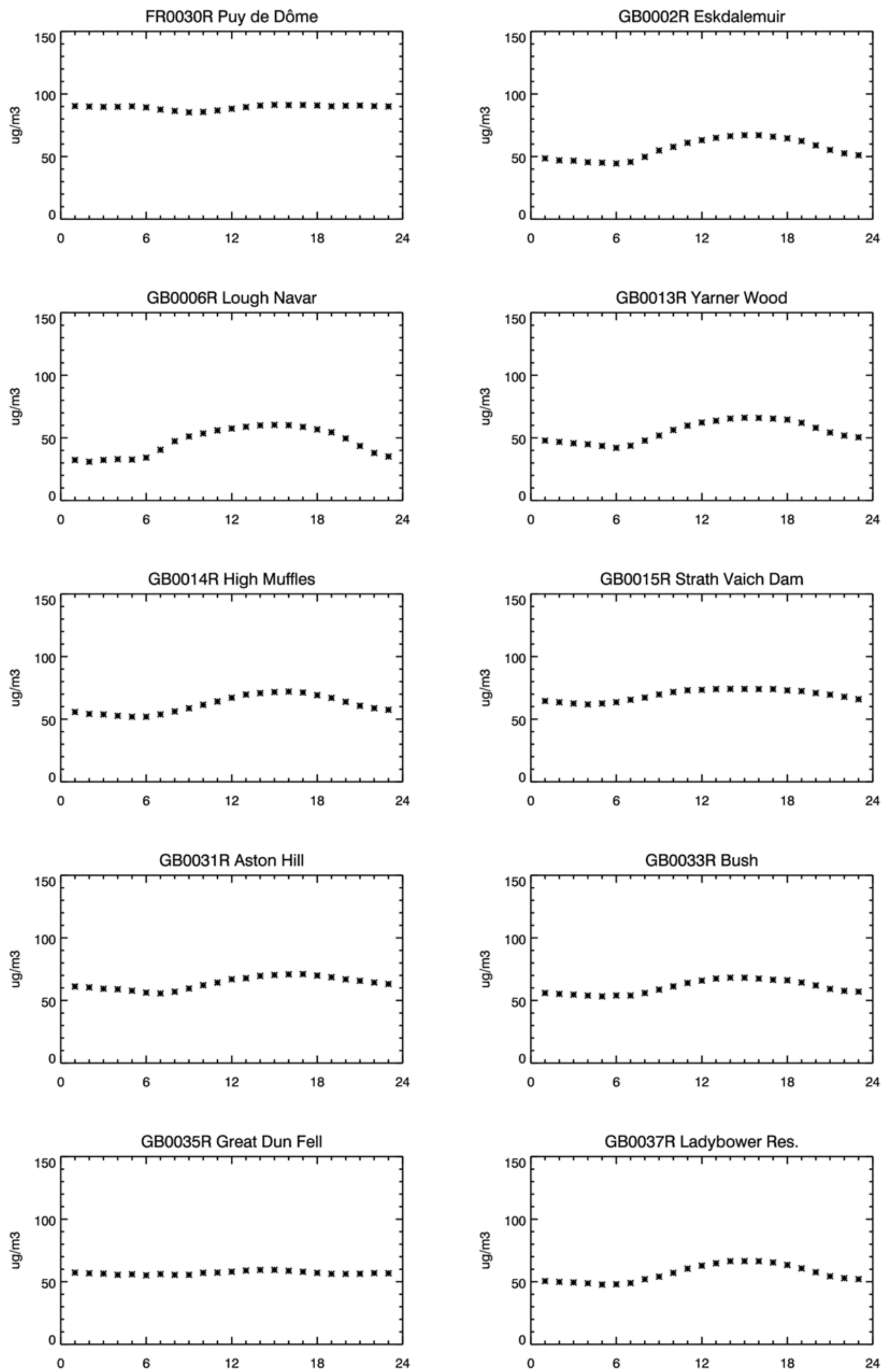

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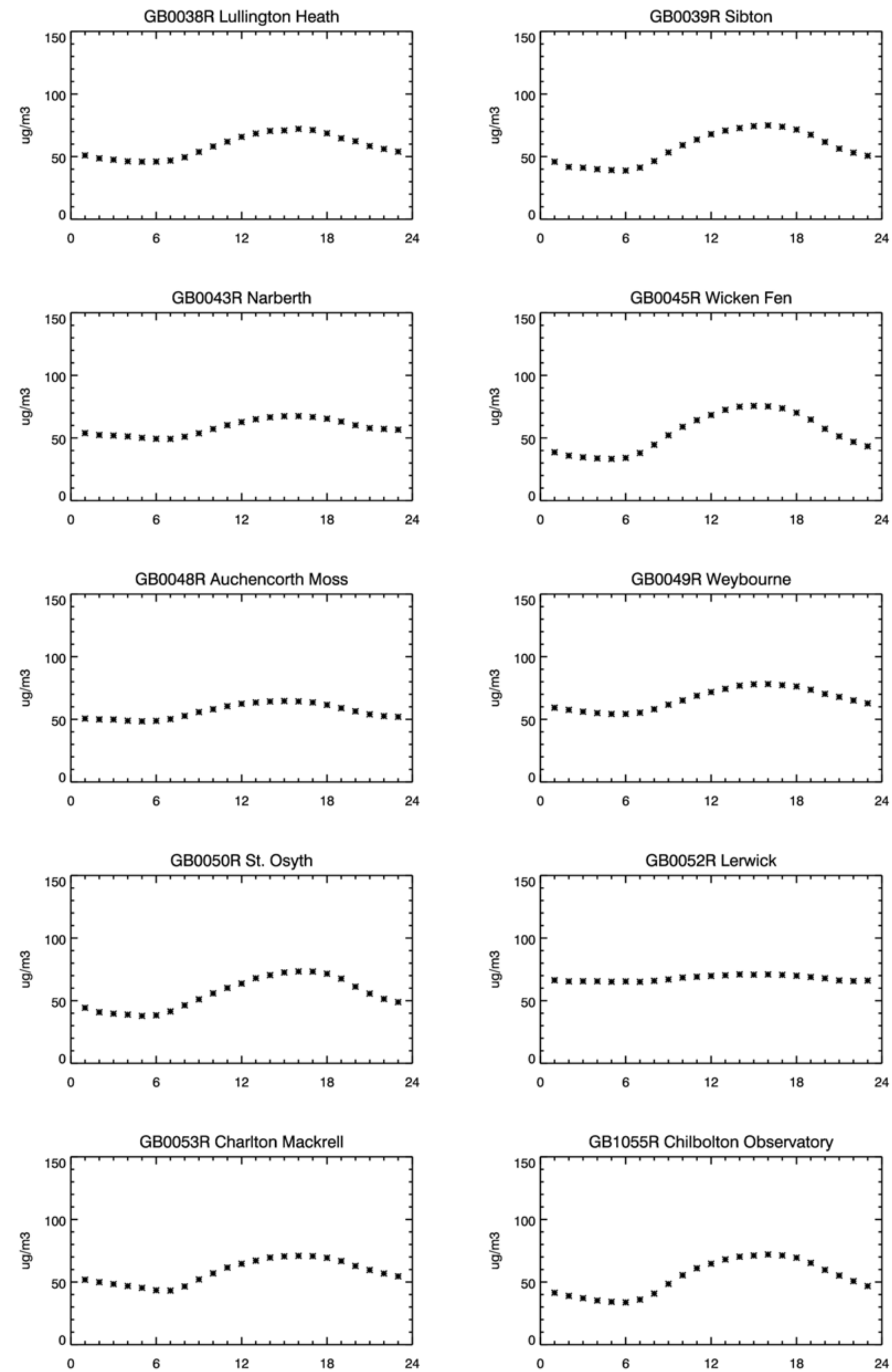

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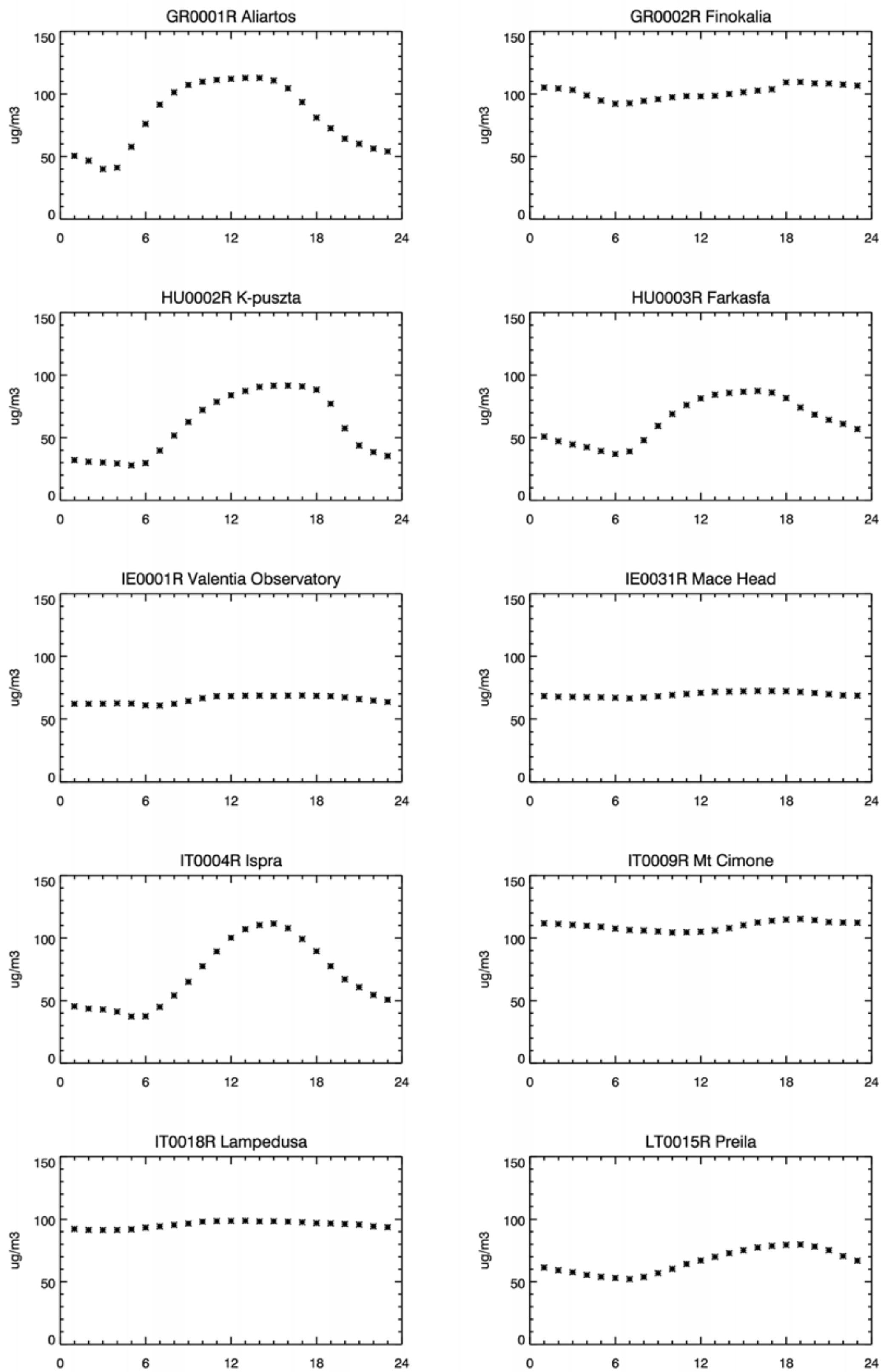

Figure 4.1, cont.

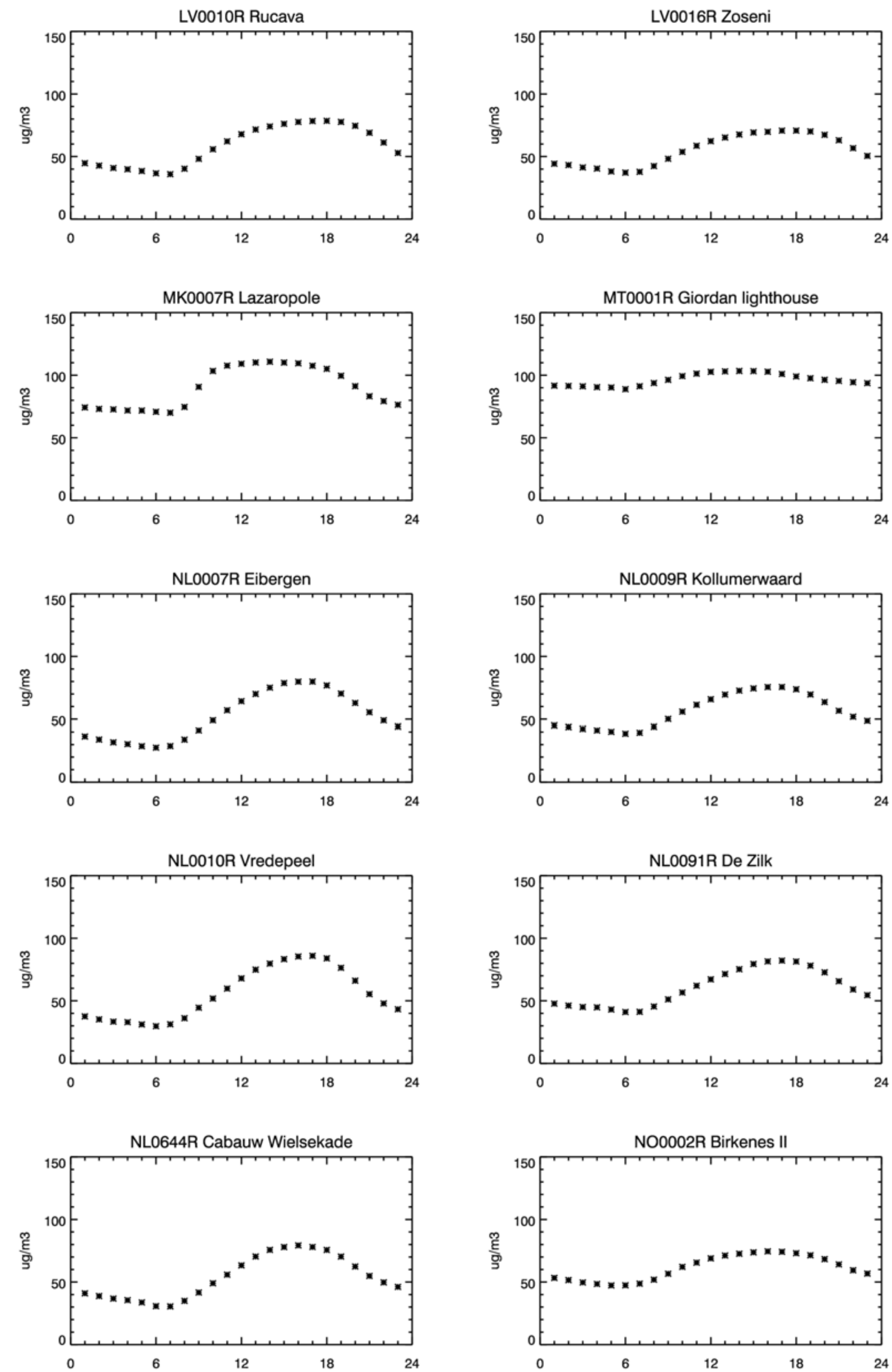

Figure 4.1, cont.

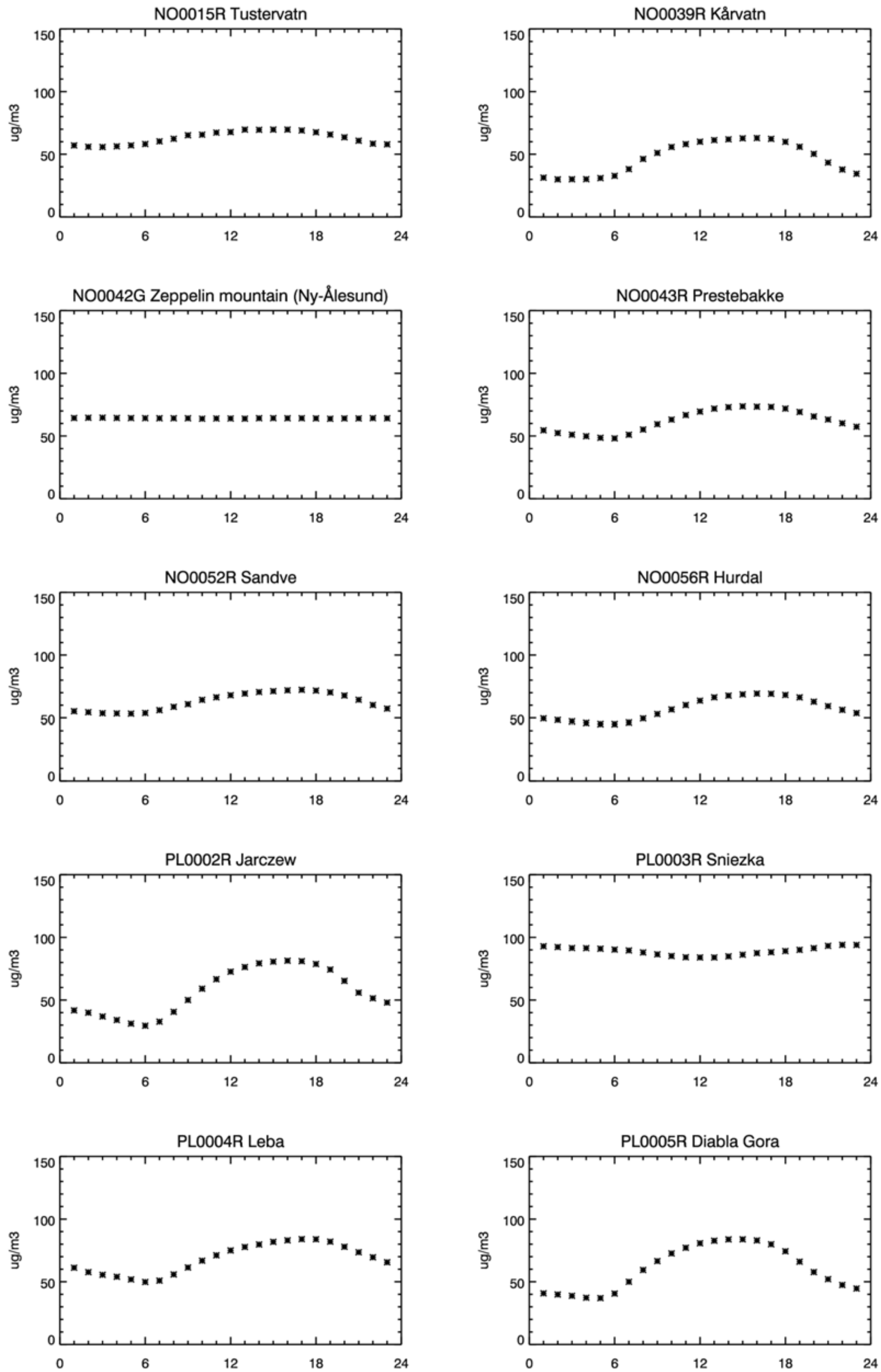

Figure 4.1, cont.

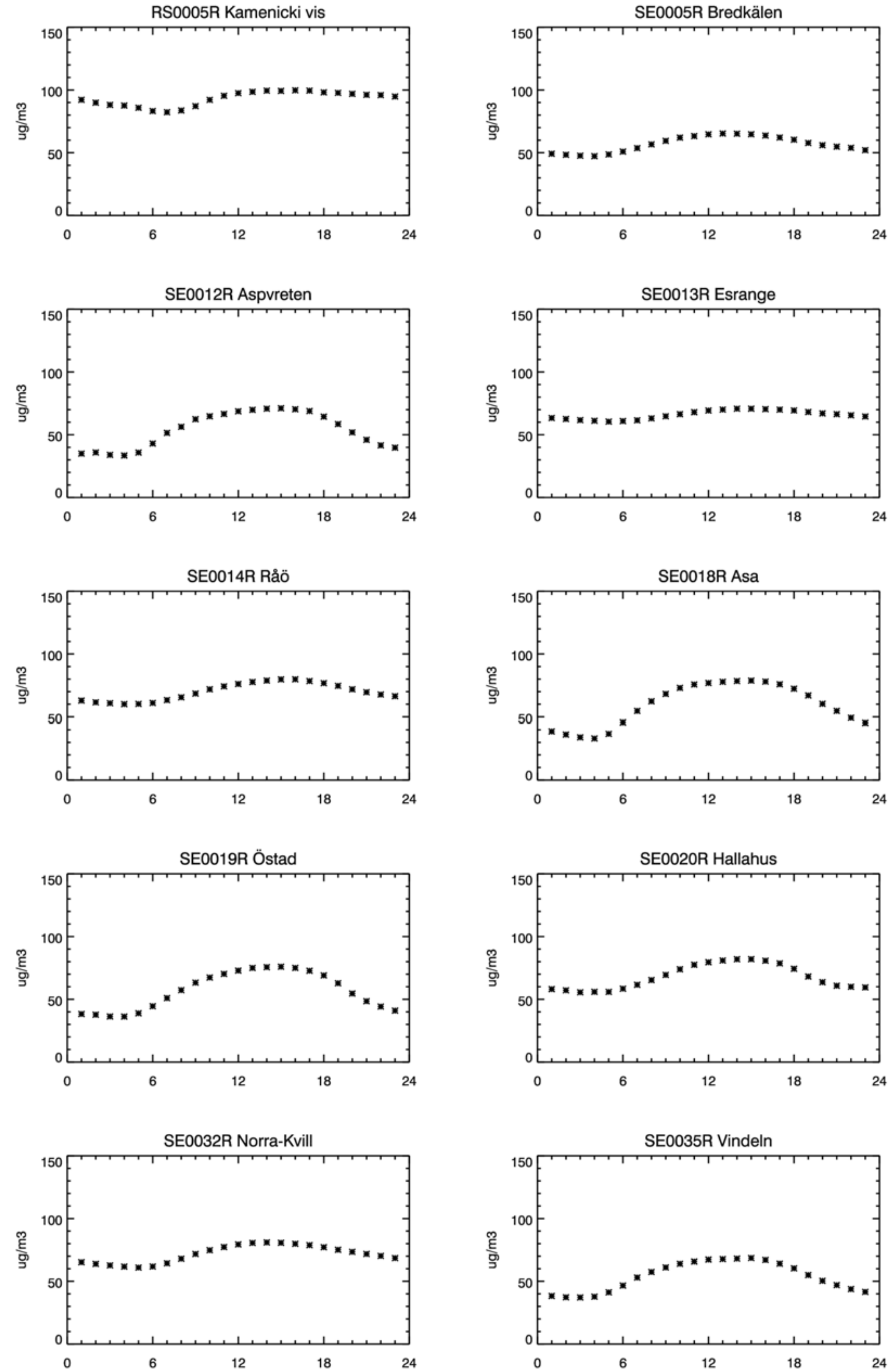

Figure 4.1, cont.

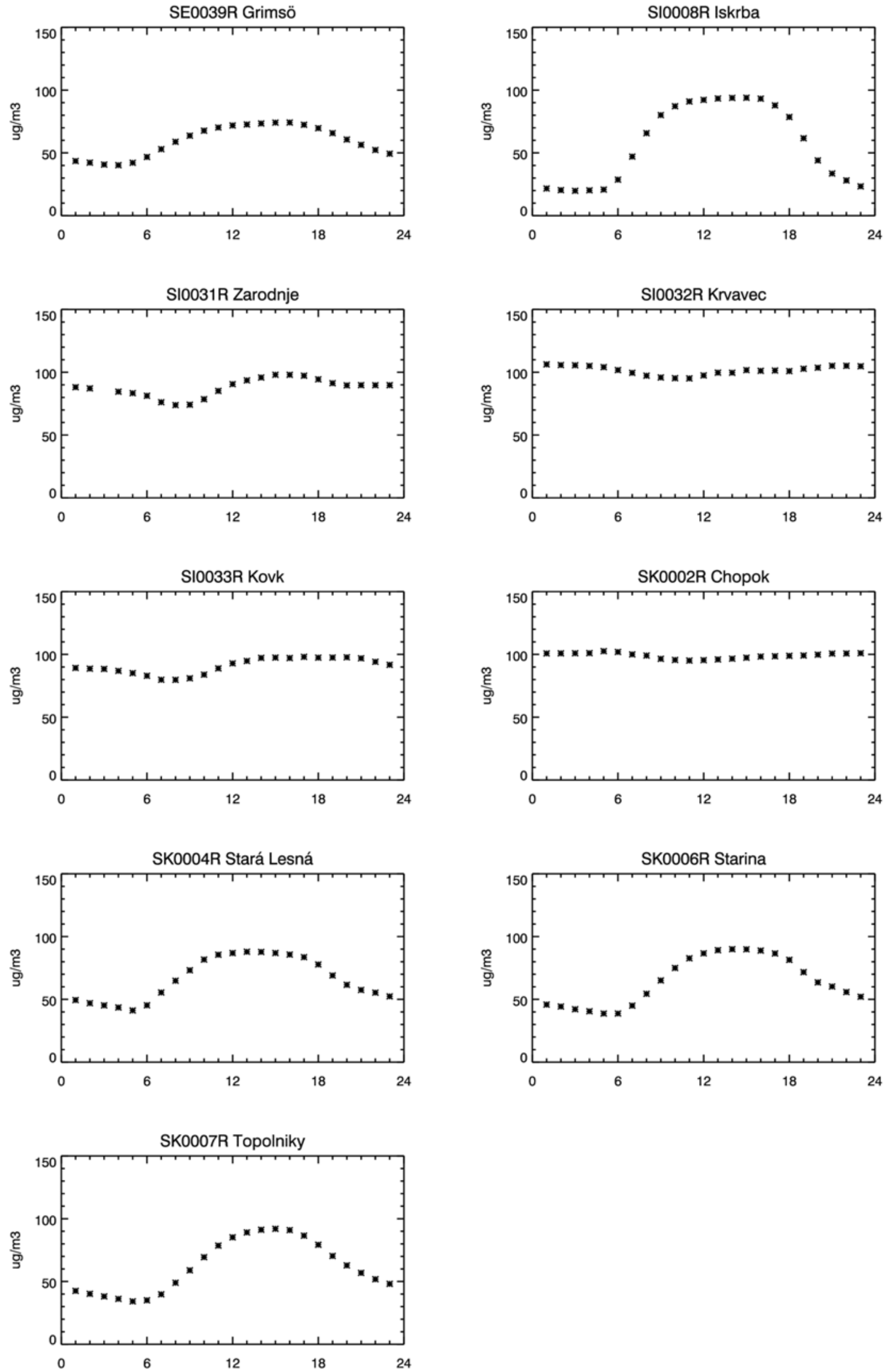

Figure 4.1, cont.

Annex 5

List of data reports

Ozone measurements in the ECE region January 1985–December 1985.
Report no. 1. EMEP/CCC-Report 3/89 by U. Feister and U. Pedersen.
Potsdam/Lillestrøm, Meteorological Service of the GDR/Norwegian Institute for Air Research, 1989.

Ozone measurements January 1986–December 1986. Report no. 2.
EMEP/CCC-Report 8/90 by U. Feister, U. Pedersen, E. Schulz and S. Hechler.
Lillestrøm, Norwegian Institute for Air Research, 1990.

Ozone data report 1988.
EMEP/CCC-Report 1/92 by U. Pedersen.
Lillestrøm, Norwegian Institute for Air Research, 1992.

Ozone data report 1989.
EMEP/CCC-Report 2/93 by U. Pedersen and I.M. Kvalvågnes.
Lillestrøm, Norwegian Institute for Air Research, 1993.

Ozone measurements 1990–1992.
EMEP/CCC-Report 4/95 by A.-G. Hjellbrekke.
Kjeller, Norwegian Institute for Air Research, 1995.

Ozone measurements 1993–1994.
EMEP/CCC-Report 1/96 by A.-G. Hjellbrekke.
Kjeller, Norwegian Institute for Air Research, 1996.

Ozone measurements 1995.
EMEP/CCC-Report 3/97 by A.-G. Hjellbrekke.
Kjeller, Norwegian Institute for Air Research, 1997.

Ozone measurements 1996.
EMEP/CCC-Report 3/98 by A.-G. Hjellbrekke.
Kjeller, Norwegian Institute for Air Research, 1998.

Ozone measurements 1997.
EMEP/CCC-Report 2/99 by A.-G. Hjellbrekke.
Kjeller, Norwegian Institute for Air Research, 1999.

Ozone measurements 1998.
EMEP/CCC-Report 5/2000 by A.-G. Hjellbrekke.
Kjeller, Norwegian Institute for Air Research, 2000.

Ozone measurements 1999.
EMEP/CCC-Report 1/2001 by A.-G. Hjellbrekke and S. Solberg.
Kjeller, Norwegian Institute for Air Research, 2001.

Ozone measurements 2000.
EMEP/CCC-Report 5/2002 by A.-G. Hjellbrekke and S. Solberg.
Kjeller, Norwegian Institute for Air Research, 2002.

Ozone measurements 2001.
EMEP/CCC-Report 4/2003 by A.-G. Hjellbrekke and S. Solberg.
Kjeller, Norwegian Institute for Air Research, 2003.

Ozone measurements 2002.
EMEP/CCC-Report 2/2004 by A.-G. Hjellbrekke and S. Solberg.
Kjeller, Norwegian Institute for Air Research, 2004.

Ozone measurements 2003.
EMEP/CCC-Report 4/2005 by A.-G. Hjellbrekke and S. Solberg.
Kjeller, Norwegian Institute for Air Research, 2005.

Ozone measurements 2004.
EMEP/CCC-Report 2/2006 by A.M. Fjæraa.
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